

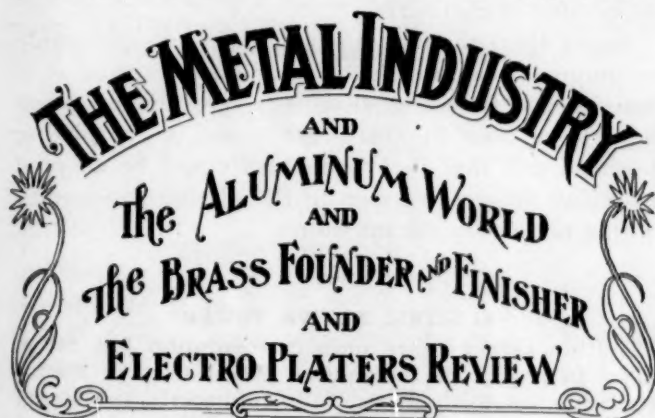
THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
AND ELECTRO-PLATERS REVIEW.
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

OLD SERIES
VOL. XI., NO. 4.

NEW YORK, APRIL, 1905.

NEW SERIES
VOL. III., NO. 4.



PUBLISHED MONTHLY BY

The Metal Industry Publishing Company

(Incorporated)

61 BEEKMAN STREET, NEW YORK

PALMER H. LANGDON,	Publisher
GEORGE P. SCHOLL	Editor
JOHN B. WOODWARD,	Director

Subscription Price \$1.00 per year, postpaid to any part of the world. Single copies, 10 cents.

ADVERTISING RATES ON APPLICATION.

COPYRIGHT, 1905, BY
THE METAL INDUSTRY PUBLISHING COMPANY.

ENTERED FEBRUARY 10, 1903, AT NEW YORK, N. Y., AS SECOND CLASS MATTER
UNDER ACT OF CONGRESS MARCH 3, 1879.

CONTENTS.

	PAGE.
Editorial	59
Molding Trolley Wheels in a Molding Machine	61
Modeling Wax	62
Compound Metallic Articles	62
The Manufacture and Use of Gold and Silver Solders	63
Drawing Sheet Metal Goods Without Annealing	64
German and English Brass Foundries and Rolling Mills	65
New Source of Aluminum in India	66
New Method of Coating Metals	66
The Composition of Plating Baths	67
Rules in Handling Nitric Acid	68
Oxidized Silver and French Gray	68
Liquid Caustic Potash	68
The Manufacture of Steam Brass Goods	69
Melting Scrap Aluminum	69
Combination Metal Mold for Brass Castings	70
Mechanical Electroplating	71
Rapid Cut Power Saw	71
Correspondence Department	72
Readers' Opinions	73
Patents	74
Trade News	75

THE CONNECTICUT BRASS INDUSTRY.

An interesting report has recently been issued by Mr. W. H. Scoville, the Commissioner of the Bureau of Labor Statistics of the State of Connecticut. It shows that the brass industry largely predominates among the various industries of the State, as the amount of wages paid during the year 1904 amounted to \$13,119,497.57 out of a total of \$55,601,900.36, while that of the next highest industry, the general hardware, amounted to about five and three-quarter million dollars. There was an average increase of 0.8 per cent. in the amount paid in wages in the industry above that of the year 1903. The average number of persons employed was 25,443, showing an increase of 0.7 per cent. over those employed in the previous year.

The average number of days, during which the 94 brass works which reported were in operation, was 297.9, a decrease of 2.5 per cent. over the number of days of the previous year, due to the slackening of the demand for a little while during the Presidential campaign. The average weekly hours of labor were 57.7 and the annual average earnings of the workmen during the year 1904 amounted to \$515.64, as compared with \$515.46 during the year 1903. The average daily earnings were \$1.73, as compared with \$1.69 in 1903, showing an increase of 2.4 per cent. The average annual earnings of the men employed in the brass industry are only surpassed by several other industries, which employ a high class of skilled labor.

The gross value of the product manufactured during the year 1904 amounted to \$58,499,143.65, showing a decrease of 6.9 per cent. when compared with the value of the previous year, which was \$62,854,065.68. The percentage labor cost of the gross value of the product in 1904 was 22.4, while the percentage cost of material, interest, insurance, taxes, rent, miscellaneous expenses and profit amounted to 77.6 per cent. Notwithstanding the decrease in the number of days of operation there was an increase of 1.7 per cent. in the proportion of product value which went for the compensation of labor, and the value of the product was \$2,299.22 for each person employed. It appears from these statistics that the brass industry in the State of Connecticut is still by far the most important of the manufacturing interests of the State.

THEORY AND PRACTICE IN ELECTRO-PLATING.

No one will or can deny, who has come into contact with the electro-plating business, that a great deal of practical experience is required in order to obtain the best results in the various operations of plating with different metals. It is a fact frequently overlooked by the theoretical electro-chemist when talking about electro-plating, that the plater does not desire to obtain only an electro deposit of metal as such, but that this deposit must have certain characteristics such as color, brightness, etc., as the case may be. By practical experience with various solutions the plater has found out that the result will be satisfactory from his standpoint when he uses a certain solution in a certain way. The influence of various additions of other chemicals to the plating bath upon the character of the deposit obtained has also been ascertained in the same way. Undoubtedly there has been in some cases a great deal too much claimed for the influence of various additions, familiarly called "dopes," and many substances have been added to plating baths, the selection of which can only be attributed to the fact that the compounders were unacquainted with the elementary facts of chemistry.

Nevertheless the fact remains that such additions to the plating solution or the electrolyte, as it would be called by electro-chemists, do exert a favorable influence upon the deposit. This fact has been frequently questioned by electro-chemists, but a very striking proof of it is furnished by the Betts process of electro-refining of lead in a lead fluo silicate solution. It has been found in this connection that a slight addition of gelatine or a similar organic compound exerted a very beneficial influence upon the character of the deposit of lead, inasmuch as it was possible then to obtain a much smoother deposit. In this respect, therefore, the practical plater stands vindicated.

As far as the theory of electro-plating is concerned it must be said also that with the complicated electrolytes, which are used sometimes in the plating business, it would be a very difficult thing to determine precisely just what electro-chemical reaction was taking place and in what manner each of them exerted its influence upon the general character of the deposit. Thus far the plating practice is ahead of the theory and the plating practice is no exception in this case, as in a great many cases results have been obtained by experiments which only received their explanation much later.

But on the other hand there is a great deal which the practical plater might learn of the methods employed by the electro-chemist and which could with advantage be introduced into the plating business. There is no doubt that in a great many instances the plating operations are conducted entirely too much by rule of thumb; an element of luck and chance enters into them, which should be eliminated. Much can be

accomplished towards this goal by adopting extensively the method of exact measurement of the current and of keeping the current strength proportionate to the amount of wares hanging in the bath, in other words keeping the current density, that is, the number of amperes per square foot of electrode surface, constant and at such a figure as has been found to give the most satisfactory result for any given plating operation. Attention has to be paid, of course, also to the purity of the chemicals used, so that the bath will be made up always with the same proportion of chemicals.

Going along these lines would mean unquestionably an improvement in the plating business, and it is satisfactory to know that they are already being adopted at least by the larger works in the plating business and that they undoubtedly will be adopted by many progressive men in the plating community within not a very distant future.

ELECTRIC MOTIVE POWER.

Within recent years quite a revolution has taken place in regard to the motive power used in manufacturing establishments. While formerly the steam engine in connection with shafts and belting reigned supreme, the latter have now been replaced in a great many instances by the electric motor. The paramount question of the present day is economy in steam consumption and the reduction of all losses to the lowest possible limit. Unquestionably such a purpose can be served best by the installation of a central power station provided with engines of the latest and most economical type, which are constantly under the eye of trained attendants. Electric motive power is unapproached by any other power on account of its adaptability, the ease with which it can be brought to the point wanted and the ready connection which can be made with the machine which is to be driven by it. This gives it quite an advantage over shafts and belting and over the hydraulic and pneumatic system. Furthermore, the comparative ease of running the electric motor, the little necessity for attending it and its freedom from noise give it further decided advantages. It is therefore not surprising that its introduction into a variety of mills should have been so rapid and that it should have been adopted for running all kinds of machinery from the ponderous rolling mill and the heavy foundry crane down to the small buffing lathe in a plating establishment. This has been carried so far that a number of the modern and up-to-date establishments are driven altogether by electricity. There is no question that the electric drive has come to stay, and that, as the advantages become more and more recognized, it will replace the old-fashioned method of driving to a still greater extent than it does at present.

ANOTHER GROWTH.

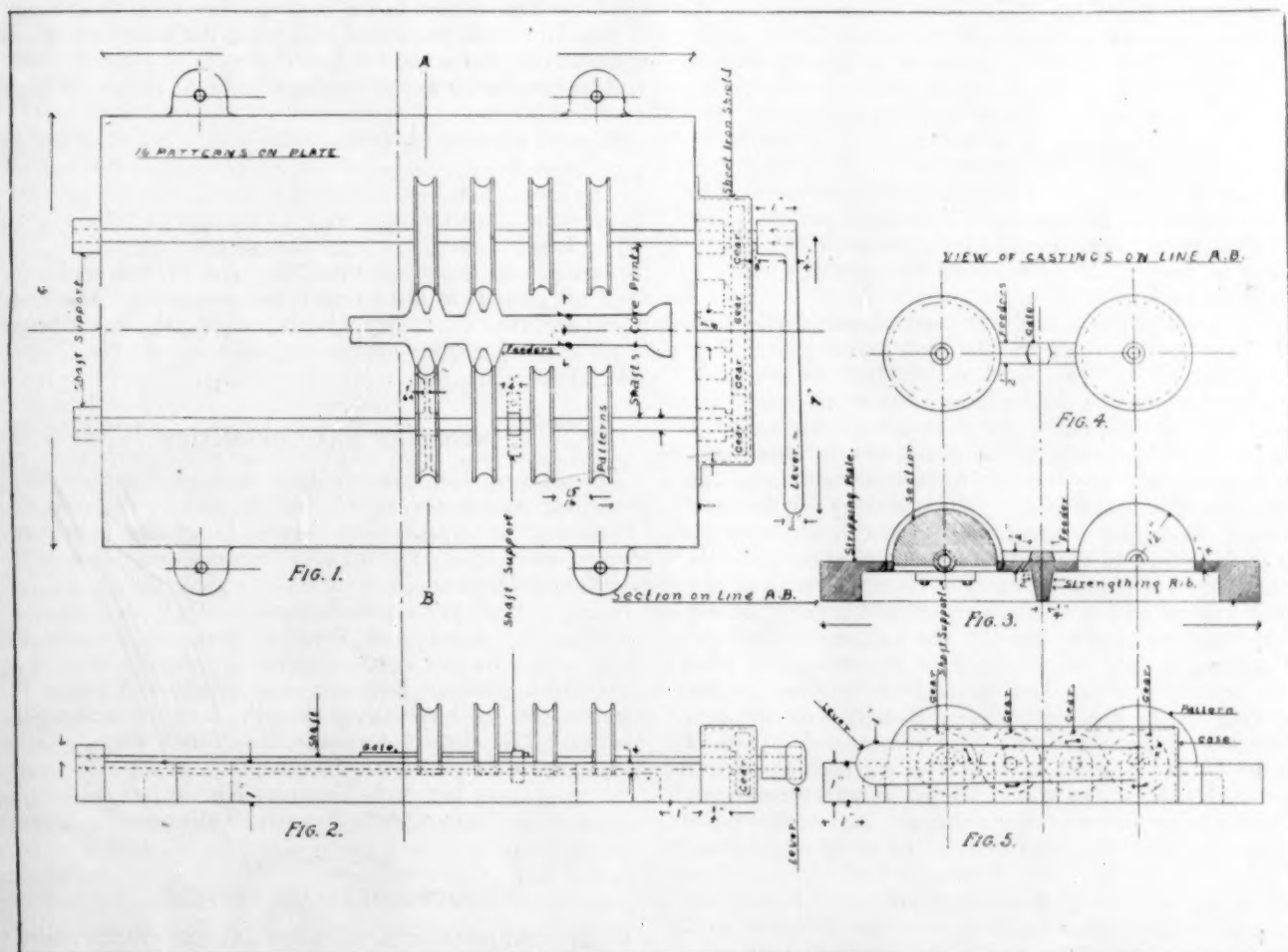
With this issue THE METAL INDUSTRY is enlarged four pages, making the second time this year that the reading and advertising pages have been increased. We are also pleased to report that the subscription list never grew faster than at present, the past month breaking all records.

MOLDING TROLLEY WHEELS IN A MOLDING MACHINE.

By F. H. BROWN.

Among the many modern tools that are used in the brass foundry one of the most important is a molding machine. Such machines have demonstrated their great value, although they are expensive to install, some of them more so than others. There are many types of machines, some of which are worked by hand and others by air power. As a general rule, however, the small brass foundries are using hand power machines as the first cost of installing this type is the cheapest. The larger brass foundries, some of which are run together with iron foundries are using machines operated by compressed air. The air plant installed for the iron foundry can also be used for

The construction of a trolley wheel is such that if it is to be made by a stripping plate it requires a different stripping movement than that found in molding machines on the market, and it is the practice to mount such work on a plate such as is shown in Fig. 1. Like all stripping plate work, it is rather expensive, and it is only used where a large quantity of wheels come into consideration. The illustration shows a plate rigged with 16 patterns mounted on two shafts. These shafts are half above and half below the top flat surface of the plate and are supported in this position by end and center bearings. On the right hand end of the plate is a set of small gear



TROLLEY WHEEL MOLDING MACHINE.

the brass foundry, and likewise a molding machine for iron can be used for brass. Such air power machines cost anywhere from \$250 to \$500 and they are worked at 75 to 80 pounds of air pressure. They are of the stripping plate and match plate kind and are no more expensive to fit patterns to than the cheap stripping plate machines. The construction of some patterns is such that special machines are necessary, and as there is no firm making these special machines they are generally built by the users who know something about machine molding. I presume that more foundries would be doing likewise if they only knew how and I, therefore, will endeavor to show how to construct a trolley wheel machine which is a small but practical device.

wheels meshing with each other, each shaft having a gear fastened on it, while the other two gears are pivoted to the end of the plate. A crank is fastened to one shaft by which the 16 trolley wheels are turned out of the sand through the stripping plate which is cut to the shape of the outline of the patterns. The gears are protected by a sand shield.

The stripping plate for this job should be quite stiff and strong, say, one inch to $1\frac{1}{4}$ inch thick all around the edge and $\frac{3}{4}$ inch thick in the center, with a stiffening rib running lengthwise of the plate directly under the plate where the running gate is fastened to the plate. This construction is clearly shown in Fig. 3. On the underside of the plate, where the center supports are for the shaft,

a finishing pad is located. There should be four of them on the bottom of the plate. On the wood pattern of this plate, the center line of the two shafts is then laid out and an opening is cut clear through the plates, which is 1-16 inch smaller in diameter than the diameter of the shaft. The opening goes clear across the plate from the inside faces of the shaft support. The size of the shaft is the same as the size of the core hole in the pattern of the trolley wheel.

On the left hand end of the wood pattern of plate there is fastened two lugs for the support of the shaft. Then the wood patterns for the four center shaft supports are made and the castings are fastened to the underside of the cast iron plate on the finished pad, the boss in the center of this support protrudes up through the shaft slot and is made $\frac{3}{8}$ inch larger in diameter than the size of the shaft. A pattern of the lever is then made and the four flask pin ears are then tacked on to the wood pattern of the plate. The pattern is then sent to the iron foundry for one good casting like the plate shown in Fig. 3, and from the other patterns brass castings are made. It is also necessary to make a master pattern of the trolley wheel, a sectional view of which can be seen in Fig. 3. It is a little more than half a pattern with a center stock for the drilling of the shaft hole. This master pattern is sent to the molder and the desired number are made. If the molder is careful, these castings for patterns will only need filing up.

After the stripping plate has been planed the location of the patterns, the shaft and the flask pins are laid off on the top face of it. This work cannot be done too accurately as the patterns on the front side of the center line on the face of the plate make the cope for the rear sections of the patterns and the rear ones for the front ones. The locating lines are, therefore, laid off with care and scribed strongly on the plate. The openings for the shaft are then filed just so that the shaft can slip through, then each pattern of the trolley wheel is filed up and each one is given a designating mark. These patterns or one special pattern to represent them all which could be cut directly on the center line of the pattern. The special pattern is laid on the face of the stripping plate in the correct position and around its outline a line is scribed on the face of the plate and likewise the precise location of each pattern. The iron stripping plate is then filed out to these scribed lines for each respective pattern. The openings are numbered to correspond with the designating marks on the pattern. The neater these openings are filed the nicer will be the mold made from this job.

When the pattern openings are all dressed out, the openings for the center shaft support are filed out true with the shaft and to the size of the finished shaft support. The end bearings for the shaft are then laid off, and drilled so as to let the shaft protrude just one-half of its diameter through the plate and in direct line with the field opening for the shaft. The brass lever is then filed up and machined to fit one end of the shaft. It is then necessary to get four small gears, all alike, of large enough diameter so as to make up the distance between the shafts, all meshing into one another. The shaft, patterns, and the center shaft support are then fastened in place, pinning each pattern to the shaft. The four gears are then put in their place and the crank is fastened on, and the sheet iron shield is put on, so as to protect the gears from sand.

In the center of the end bearing on the left hand end of the machine a 3-16-inch hole is drilled clear through the bearing and the shaft and a locking pin provided to fit

this hole. This pin will keep the pattern in true position while the mold is being made. A pattern is then made of the running gate and a brass casting made from it. This is filed up and fastened to the plate in the correct position. The plate is then drilled in each ear for the flask pin. These pin holes must be accurate with the patterns on the plate so as to secure a perfect match of cope and drag. An iron flask is generally used for this work, and if the flasks are all drilled with a jig, then they will be interchangeable and good results will be obtained from the job.

In order to make a mold, the plate of patterns is placed on a table or on a machine of the squeezer type. The flask is then filled with sand and by putting on the squeezer lever the sand is pressed into the flask. The head is then thrown back, the locking pin pulled out and the lever turned over in the opposite direction. The flask is then lifted off, the cores set in and the same operation repeated for the cope. When the mold is poured there will be obtained a set of castings like that shown in Fig. 4 on line A. B.

A good mixture for trolley wheels is:

Copper	25	lbs.
Tin	3	"
Zinc	13	"
Lead	6½	"

to which a little phosphorous, say two 6-inch sticks to each 175 pounds of the mixture, are added. All kinds of alloys are used for trolley wheels, but the above mixture, in my experience, has proven a good one.

MODELING WAX, CORRECTION.

Through a typographical error the formula for modeling wax in the article by Mr. W. C. Parman on "Modeling as Applied to Brass Founding," in the March issue of THE METAL INDUSTRY, page 41, was given as follows:

48 per cent. Beeswax.
14 per cent. Venetian Red.
84 per cent. Beeswax.

As the ingredient beeswax was mentioned twice, it was obvious to our readers that the formula was misprinted. The correct formula is as follows:

84 per cent. Beeswax.
14 per cent. Venetian Red.
2 per cent. Russian Tallow.

COMPOUND METALLIC ARTICLES.

Compound metallic articles are to some extent being substituted for plated goods in the manufacture of various cooking utensils, bicycle rims and handle bars, etc. They are made by sweating ingots of the more expensive and the less expensive metal together; for instance, copper and steel or nickel and steel. The combined ingots are then rolled into sheets or drawn into tubes and wire, and can be utilized for a number of operations, such as pressing, spinning, stamping, drawing, etc. The metals are actually welded homogeneously together, and as such, it is claimed, they are superior to plated ware when subjected to rough usage. It is also claimed that they can be placed over a fire without danger of their coming apart, notwithstanding their different rate of expansion. The compound metals may be used in thinner gauges than either brass or German silver on account of their greater resisting power.

THE MANUFACTURE AND USE OF GOLD, SILVER AND BRASS SOLDERS.

By THOMAS CLARE.

In the manufacture of all kinds of solder the greatest care is absolutely necessary as far as the selection of the ingredient metals is concerned, inasmuch as they must be of the best and cleanest quality in order to obtain good results. Great care is also necessary in weighing these metals out so as to insure that the proportions will be absolutely correct. This remark applies especially to the harder metals as the solder must flow easier than the metals to which it is applied.

The method employed for manufacturing consists in, first, melting the harder metals; that is, those requiring the most heat in order to be melted. The more fusible metals are then added and the mixture is stirred with a graphite stirrer or a clean iron bar. When the mixture has reached the proper heat, which is a matter of nice judgment acquired by skill and experience, it is poured off. This method applies to all solders, gold, silver, brass, etc., and as the readers of THE METAL INDUSTRY doubtless know, to practically all composite metals.

When the manufacturer of solder receives complaints regarding his metal he will generally find that the trouble can be traced to unclean or poor ingredients in his mixture. Although a solder may look clean and bright and may also roll fairly well, when the necessary care is used, the trouble will surely come out when it is used. The source of such trouble is generally traceable to the use of scrap brass, shop sweepings (refined), etc. In order to be safe, the manufacturer of solder and particularly of silver and high-grade solder, should make his own brass. As stated above, scrap brass is always open to suspicion, and even though the manufacturer buys new brass he is always taking chances, inasmuch as some manufacturers use a certain percentage of lead in their brass, and the presence of lead in the solder means spoiling it.

As a rule, a solder containing scrap brass or other unclean metals will burn and refuse to run well under a little too much heat and whatever of it does fuse will be found to be hard and brittle. Such solder, even when handled by a skillful workman who is aware of its nature, will run lumpy. It thus requires an extra amount of solder and means that the user has to spend an additional amount of money for that much extra filing of each article, to which it is applied, which is evidently a poor business proposition. That the occurrence of this trouble is unnecessary, is proved to me by the fact that I have made a silver solder for soldering mounts on large meat dishes and hollow-ware (pitchers, creamers, etc.); and which could also be used on solid silver or German silverware. This solder flushed so well that there was absolutely no filing required. Such a solder is called a "Flush" solder. I will describe in the following my personal method, which always gives me good results:

After carefully weighing the copper, zinc, silver or other ingredients, I place the copper in a crucible in the bottom of which I have placed a layer of charcoal. When this is nicely melted I add the more volatile metals and after the whole batch is melted I stir it thoroughly. During this operation I take care to reach the bottom of the crucible each time so as to stir the charcoal through the molten metal. The latter is cleaned thereby and when it again reaches the proper heat I pour it off. When using tin in my solders I put that metal in last and pour immediately after a thorough stirring.

In making gold solder, I first melt the copper, then the silver and other metals if used (sometimes a small percentage of zinc is used), and add the gold last. There is

no great difference in the melting point of copper, silver and gold, but the method above described I regard as the safest plan. Gold solder must be brought to a good heat in order to insure a good rolling quality. A valuable point to be acquired by the manufacturer of solder is the judgment of the correct heat at which to pour the metal. If it is poured before the proper heat is reached, the metals will not alloy properly and if it is left long after the proper heat is reached it is obvious that part of the more-volatile metals will be lost and the proportions of the mixture will consequently be changed.

Gold and silver solders are manufactured in different forms, rolled in strips or drawn into wire and some silver solder is used in a pulverized form according to the purpose for which it is intended. Some hard brass solders are rolled into strips, but most of it is ground in a grinding machine, or in the case of the softer grades it is pulverized with pestle and mortar to the required size. An instance of the use of solder in such form is found in the soldering of brass tubing for gas pipes, etc. The tubes being fitted, the pulverized solder, together with the flux (borax) is placed on the seams. The tubes are then passed slowly through a very hot oven and come out at the other end firmly soldered.

The uses of solder are innumerable. Gold solder is the medium for soldering platinum and is, of course, largely used in the manufacture of gold jewelry. A large amount of silver solder, however, is used on gold articles where the solder parts cannot be seen and it answers the purpose fully as well. Silver solder is used extensively both by the manufacturer of solid silver and German silver. There are a great number of grades in silver solder, that is to say, grades of hardness, not of quality, as there are also in gold, brass and plumbers' solder. As an illustration of the use of two grades of solder on one piece of work may be mentioned the operation of "setting up" of a German silver teapot. The body is struck up in dies in two halves and the same is done with the spout and the handle. The two halves of the body are then carefully fitted and soldered with a very hard grade of solder. The two halves of the spout and the handle are fitted and soldered in a like manner with the hard solder. In order to solder the handle and the spout to the body, however, it is obvious that the same grade of solder cannot be used for the latter purpose as the heat would melt part of the solder already used before. Therefore the softer grade of solder is used which will flow at a much lower temperature than the hard solder and will not "fret" it when used.

Some manufacturers of hollow-ware, in cases where the bodies are struck up in the manner mentioned above and those bodies are afterward mounted with handles, spouts or ornamental fittings, first solder the bodies with a German silver solder, and use a silver solder for the mounting of the handles, etc. The latter solder will run over the German silver solder without trouble, but most silversmiths prefer the silver solder on account of its better running qualities.

In order to realize the tremendous amount of solder used by the solid silver and German silver manufacturers, one must think of the numerous varieties of their goods. Such articles as the hollow handles (stamped in two halves) of knives, forks, spoons, button hooks, ladles, manicure sets, etc., also mountings on hollow-ware, meat dishes, waiters, large ornamental pieces composed of a number of different parts, candelabra with their arms,

saucers and feet to be soldered and other articles too numerous to mention, require tons of solder a year. Plumbers' solder is also used by the manufacturers of hollow-handled ware for fastening knife blades or forks, etc., into the hollow handles. A good silver solder is sometimes used for patching up imperfect castings by some manufacturers, especially in the case of rush orders, where no time can be spared for a new casting. Silver solder is also used extensively for trolley and feed wires, musical instruments, etc.

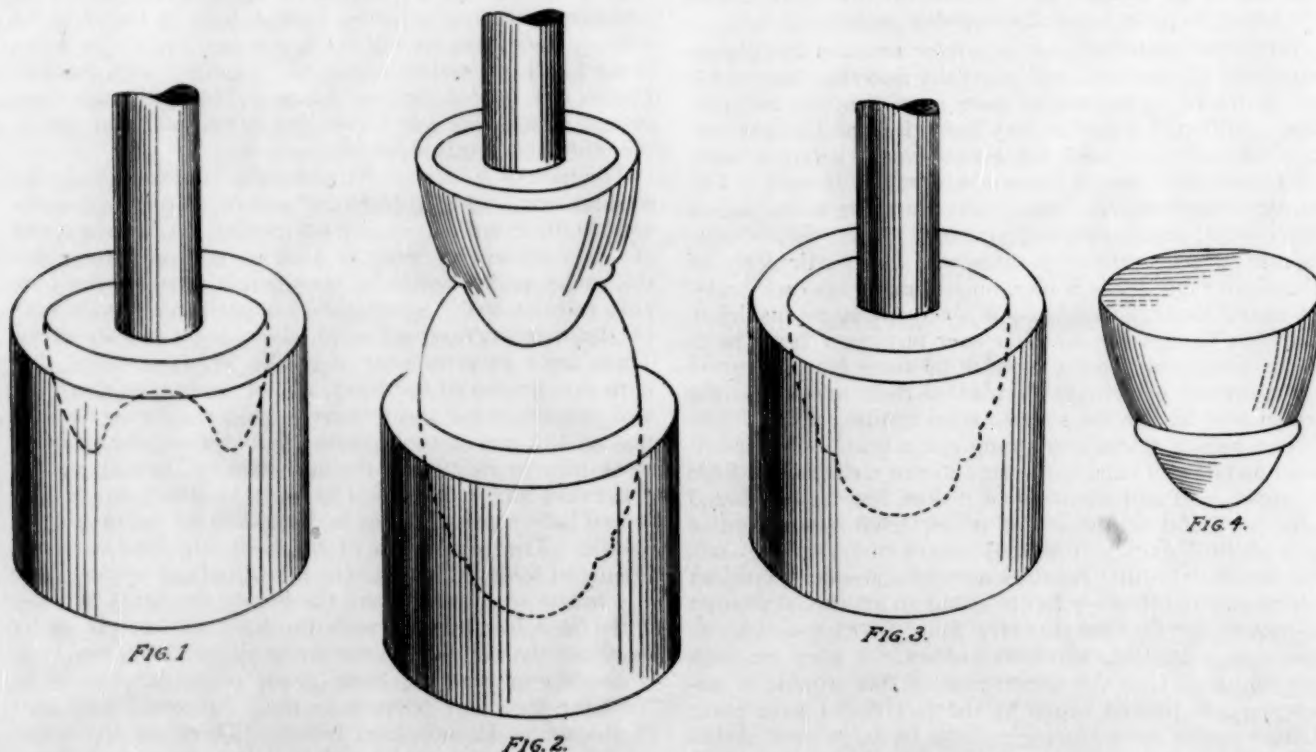
DRAWING SHEET METAL GOODS WITHOUT ANNEALING.

By E. T. KELLEY.

The drawing of sheet metal goods is one of the most useful methods to produce various shaped articles, and the only drawback the manufacturer in that line of business has experienced in the past has been the difficulty of procuring men skilled enough in the practice of the art so that they could properly handle the material. It is my

my attention was drawn to men who were at work spinning shells for the tops of bird cages. This, of course, was a very slow as well as a very costly method. When I saw my employer in my department I asked him why he did not have the large tops pressed. He asked me whether I was another of those sheet metal lunatics, and then took me down to his press room and showed me press and drop tools which he said cost him several hundred dollars. He told me that some of them worked, but that the cost of the lost metal was more than the cost of spinning. I looked over the tools and selected some of them, so as to show him how to do the work with them by pressing.

The method which I used on this particular job is illustrated in the sketches accompanying this article. I first proceeded in the way illustrated in Fig. 1. This shows that my object was to draw one part of the shell down and the center of the shell up. I intended, of course, by this procedure to get the entire depth of the shell in this operation, hence half the depth on the outside of the force and the other half up on the center of the force.



opinion that with the modern tools and skilled workmen wrought metal articles can be formed into almost any shape that can be produced by making such articles in the old-fashioned sand mold. The operation can, moreover, be performed without the costly process of annealing, which takes away and does not add to the strength of wrought metal. By this means the cost of production can be considerably cheapened and in addition the manufacturer is able to keep his stock always replenished so that he can fill orders promptly with standard and uniform goods. I believe that we will see in the near future a good many contractors calling for sheet metal goods, as, in fact, already now nearly all the contractors in the large cities prefer stamped goods.

In the following I will explain the details of a job which came to me to make some time ago. I was employed at that time by a man who looked rather doubtfully upon the production of difficult shapes by means of stamps and dies. I had charge of his tool department when one day

I then proceeded to turn the shell inside out by the method shown in Fig. 2 so as to finish it. The end of the force tool, as is clearly shown in the illustration, just fits on that part of the shell which I drew up in the center of the force in Fig. 1. The shoulder of the finishing force takes hold of the shell at the high point and thus turns the shell inside out and finishes it in this last operation. The operation of finishing is illustrated in Fig. 3 and the finished shell in Fig. 4.

The shell was made out of .023 sheet brass and was drawn 1 15/16 inches deep and had 1 3/4 inches diameter. The shell was finished entirely in these two operations without the necessity of its undergoing the costly operation of annealing, and when it was finished it was far better than the ones that the workmen had been spinning before. In conclusion, I want to call attention to the fact that in working sheet metal great care must be taken not to strain the metal, as the least strain in any previous operation will cause a fracture of the article in the next one.

GERMAN AND ENGLISH BRASS FOUNDRIES AND ROLLING MILLS.

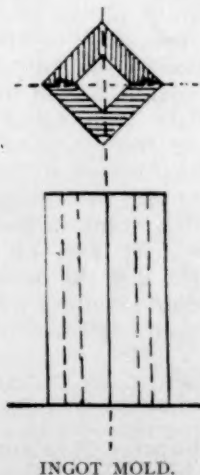
BY AXEL WESTMAN.*

(Second Paper.)

ALLGEMEINE ELECTRICITÄTES GESELLSCHAFT, KABELWERK
OBERSPREE, OBERSCHOENWEIDE NEAR BERLIN.

This establishment is one of the most modern in Germany and uses electricity as motive power. The brass foundry contains thirty stationary crucible furnaces, arranged under ground along one side of the building and provided with openings at the side for the introduction of air. Crucibles of 220 pounds capacity each are used in them. On the other side there are five furnaces of entirely different construction, one for crucibles of 650 pounds capacity, two for 440 pounds and one for 220 pounds. These furnaces consist essentially of a cylindrical sheet iron casing with fire brick lining. They hang in a cast iron support and can be lifted, lowered or tilted by mechanical means. The replacement of the lining has to be effected once a week, and the crucibles are stated to last for about 100 melts. At the time when the author was present copper turnings and other copper scrap were melted in these furnaces and ingots of 22 pounds weight were cast. The molds, which were treated with graphite, consisted of cast iron. They could be tilted and were so arranged that the cast ingots fell into a tank full of water. The tilting took place right after the solidification of the ingots in order to prevent the molds getting too hot for the following cast, as copper has a tendency to boil when the molds are too hot. It is hardly advisable, though, when casting copper into cast iron molds, to treat the latter with graphite, as gas is generated when the hot copper is cast into the mold. As liquid copper has a great tendency to absorb gases, the ingots never get solid in this way. It is better to use wood ashes brought into pasty form with water. When this paste is smeared upon the surface of a mold the water evaporates and only the ash is left, which latter does not generate any gases.

In the stationary furnaces mentioned above, copper, brass, bronze, etc., are melted. When the author was present there were cast rectangular billets of copper of about 155 pounds weight. The cast iron molds consisted of two parts which were standing together on a cast iron bottom. The molds are shown in the adjoining figure.



There were further cast rods of aluminum-bronze of about 2 inches diameter and about 36 inches length. For

*The paper appeared originally in *Jernkontorets Annaler* and is here translated from the German translation in *Metallurgie*, Dec. 8, 1904. The author, a Swedish engineer, visited a number of works on the European continent and in Great Britain.

the manufacture of aluminum-bronze, which contains 10 per cent. of aluminum, electrolytically refined copper is used in order to get a good result. After the copper has been melted in the crucible the pieces of aluminum are added and the bath is stirred well. When the two metals are mixed strong boiling takes place and the contents of the crucible are heated nearly to a white heat. The bronze thus obtained, however, is so brittle that it cannot be worked either warm or cold and has to be melted over two or three times before it can be worked. It can be said that aluminum-bronze is the better the oftener it has been remelted. As the aluminum as well as the copper vaporizes only at very high temperatures it is possible to perform this remelting without an appreciable loss of metal and without change of the composition of the metal. The last casting takes place in iron molds which are treated with a mixture of graphite, white clay and lard. When casting, special attention is paid to avoid getting any of the skin of oxide which forms on the surface of the molten metal into the molds, which would spoil the casting. The loss is about 5 per cent. of both metals. Copper is cast around the aluminum-bronze rods and the material thus made furnishes, after rolling and drawing, the so-called "double bronze" wire which is much used for telegraph and telephone wires. The bronze core gives to this wire an extraordinary tensile strength and the sheath of copper gives it a high electrical conductivity.

In the stationary furnaces mentioned above there is also manufactured phosphor-bronze, which is cast in sand in the form of plates of ellipsoidal shape from which the phosphor-bronze wire is made. The alloy used for that purpose consists of 93 per cent. electrolytically refined copper, 2 to 3 per cent. phosphor-copper with 10 per cent. phosphorus, and 4 to 5 per cent. tin. The addition of phosphorus in making phosphor-bronze of this kind is only made for the purpose of cleaning the bath. In the best phosphor-bronze there are only traces of phosphorus, and when larger amounts of this metal are in the alloy the latter becomes hard and brittle. The manufacture of this bronze takes place in the following manner: To the molten bronze bath, which is covered with a layer of charcoal dust, there is added the above amount of phosphor-copper. The bath is then stirred with a copper rod which has been well rubbed over with powdered graphite. During the stirring almost all the phosphorus, which was in excess of that required for the reduction of the oxides in the bath, burns off. Before the bath is cast, the temperature of the bath, which has increased on account of the chemical reaction, has to go down again. In order to get good castings the sand molds have to be well dried. Powdered graphite, made into pasty condition with water, is used for covering the molds.

The cast plates are rolled cold down to $\frac{1}{8}$ -inch thickness. There is only one sheet-rolling train which is driven by a 40 horse-power motor. The rolling takes place in such a manner that sheets of as circular a form as possible are obtained from the ellipsoidal plates. These round sheets are then cut up in an automatic circular shear in such a manner that a spiral strip of equal width and thickness of one-eighth inch is obtained, a waste piece being left in the middle. These strips are then rolled into wire in a small cold rolling mill, with oval and round passes. The wire is drawn

down after annealing in the usual manner. Phosphor-bronze wire has a remarkable quality. Its elastic limit lies so near its ultimate breaking strength that the two values practically coincide. It is therefore possible to load the wire nearly to its breaking strength without any deformation taking place. Besides that it has the quality of not acquiring a crystalline fracture as a result of repeated shocks and bendings. It is therefore used with advantage for hoisting ropes in mines and resists the corrosive action of mine waters much better than iron and steel.

The rolling mill contains a rod and a wire mill. The first has five three-high trains and is driven by a 200 horse-power electric motor at 500 volts. The wire mill has eight trains and is drawn by a 600 horse-power electric motor running at 1,000 volts. The train works with a speed of 450 revolutions per minute. While the author was present there were rolled American wire billets of 150 pounds weight into wire of 15-64 inch diameter. The rolling was done very well and quickly, one billet being rolled out in 40 to 45 seconds, whereby it passed twenty-one different passes. When copper wire is rolled no fin must appear on the wire when it is going through a particular pass, as it does not disappear any more when the wire goes through the following pass, but produces imperfect wires. The above rolling mill has a capacity of 30 tons copper wire of 15-64 inch diameter for a ten hour shift as well as 10 tons of rods of various metal. The firm only uses first-class billets, whereby it is in a position to guarantee a conductivity of 98 per cent. for the finished copper wire. The loss during rolling is about 0.5 per cent.

After the rolled wire has passed through the annealing and dipping process it is brought to the drawing shop. The latter contains on one side twenty-one heavy machines for drawing the coarser wire and on the other side ten sevenfold American wire drawing benches and a number of ten to twelve-fold machines with rotary diamonds for drawing fine wire. This is subsequently drawn down further with diamonds to 0.05 millimeters (0.00197 inch) thickness. In order to obtain the greatest possible accuracy in drawing wire below 5-64 inch diameter, diamonds are used exclusively. For example, for a hole of 0.055 inch diameter, a five-carat diamond is used, while a diamond of $\frac{1}{2}$ -carat is sufficient for a hole of 0.0138 inch diameter. The life of the diamonds is between one-half and one year, supposing that the stones are sufficiently large, hard and well drilled.

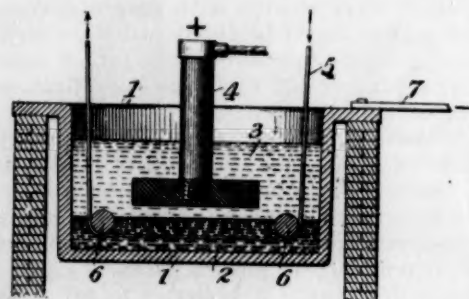
NEW SOURCE OF ALUMINUM IN INDIA.

It has recently been claimed that a new source of aluminum might be obtained from India, where thousands of square miles of surface are covered with a deposit of laterite, varying from a few feet to hundreds of feet in thickness. The laterites are closely analogous to bauxite, the aluminum being present in the hydrated form. The high level laterites particularly are claimed to bear a striking resemblance to bauxite, while the low level laterites contain much free silica and clay. The pureness of the deposits, their ready accessibility, their widespread occurrence and their association with flowing water are all points in favor of their being worked, should the demand for aluminum in India justify such a course.

THE METAL INDUSTRY recently had the pleasure of entering twelve subscriptions from the employees of the Detroit Copper and Brass Rolling Mills, showing that the paper is appreciated by the rank and file as well as the captains of the metal industry.

NEW METHOD OF COATING METALS.

A radical departure from the usual methods of coating metals is described by H. Rodman in a recent U. S. patent of Jan. 31, 1905. It is intended to secure upon a metal such as iron or copper an adherent coating of a fusible metal, such as lead, tin or zinc. It depends upon the presence of a highly electropositive metal such as potassium or sodium in the bath of the molten metal, which is to be coated on the material under treatment. The apparatus in which the operation is carried out is illustrated in accompanying cut. The operation takes place with the help of the electric current. As shown plainly in the illustration, the bath of the molten metal 2 is contained in a cast iron vessel 1. On top of the molten metal rests a body 3 of molten caustic alkali, either caustic soda or caustic potash. This latter also serves as the electrolyte of the cell. An anode 4 is provided and the material to be coated, in this case the wire 5, serves itself, in conjunction with the containing vessel and the molten metal in the bottom, as cathode. When an electric current is passed through the apparatus from the anode 4 to this cathode, sodium is set free, which diffuses into the molten metal. The



METAL COATING APPARATUS.

sodium, however, is also set free on the surface of the wire, which latter is caused by a suitable mechanical arrangement to travel through the solution continuously. The sodium thus set free on the wire serves the purpose of reducing any oxides which are present upon the surface of the wire and thus clean it, with the result that a preliminary cleaning of the wire is superfluous and the latter receives a closely adherent and uniform deposit. Two other forms of apparatus are described in the patent, one of which shows that compartment of the apparatus in which the electrolysis takes place, partitioned off from the compartment in which the wire is coated, but in this case the wire receives no preliminary cleaning in the apparatus and has to be pickled or cleaned previous to entering the apparatus in the usual manner. In the third construction the wire enters into the compartment which contains the caustic soda solution and is cleaned by the sodium or potassium set free by the electric current, but it travels out through the other compartment and thus does not come into contact with the molten alkali again after it has been coated.

Again as we go to press there are reports of the consolidation of the United Lead Company and the National Lead Company, but no more definite information seems to be obtainable than a month ago, at the time of the first rumors. The news so far seems to be based largely on the advance or decline of the stock of the respective concerns.

THE COMPOSITION OF PLATING BATHS.*

BY M. R. NAMIAS.

I have had occasion to study the most important electroplating baths from a chemical standpoint, in order to get beautiful and adherent metallic deposits with the least expense of electric power. My essentially chemical studies have been made in the laboratory with batteries, but several of these baths have been subsequently applied on a large scale and have given results corresponding to those obtained in the laboratory.

Nickeling.—For nickeling, after having tried a large number of formulas, with ammoniacal nickel sulphate, nickel sulphate with tannic acid and other organic acids, without obtaining entirely satisfactory and constant results, I have settled upon the following composition, which I can heartily recommend:

Crystallized sulphate of nickel.....	5 1-3 ounces
Ammonium chloride	3 1-4 "
Boracic acid	1 1-3 "
Citric acid	1 1-3 "
Water	1 gallon

In this bath the constituent which exercises a very favorable action is principally the boracic acid. The use of this body in nickel baths is certainly not new, but nobody has insisted on its great importance in facilitating the even deposition of the nickel, while at the same time giving it a beautiful color and brightness. According to my experience, there is no known nickel bath which can be compared for constancy and regularity of action with that into which the boracic acid enters.

Silvering.—Silvering is considered a very simple process. But on a large scale it presents some difficulties, principally on account of the variations in its composition which are produced by long usage. The bath which is principally recommended is obtained by dissolving freshly precipitated cyanide of silver in a solution of potassium cyanide. As a fact, the bath works very well, but it is necessary to avoid too large an excess of cyanide. I believe to have established that the double cyanide which one ought to try in form corresponds preferably nearly to the formula $\text{Ag Cy}, 2 \text{ K Cy}$ (1 silver cyanide, 2 potassium cyanide). It is above all necessary to try and prevent the bath from becoming too alkaline by usage, as this interferes much with the regularity of its action. It is possible to remedy this without much trouble by the addition of hydrocyanic acid. In order, however, to avoid using such a very dangerous substance, I have found that one can add from time to time a little potassium cyanide and a little monobasic potassium citrate in powdered form, which latter does not decompose the cyanide too rapidly as is done by the acids.

Coppering.—Coppering serves principally to facilitate the nickeling or the silvering of certain metals, as it is not easily possible to directly silver plate objects of iron or nickel plate articles of tin alloys, etc. In the formulas for copper baths I have always found the recommendation of use with the copper salt and the cyanide of potassium, of bisulphite of sodium and an alkali. It seems, however, that it is very little rational to have recourse to a product of such variable composition as has the bisulphite of sodium, when the final bath must be alkaline.

The following are the chemical conditions which I believe to have established for copper plating baths as the result of a great number of experiments: 1. The

baths which work best and which can be used for all metals are those the basis of which is cyanide. 2. The quantity of cyanide must not be in too great an excess, otherwise the deposit of the copper is retarded and may also be completely stopped. 3. The addition of a sulphite is very advantageous, probably because it maintains the copper, at least a great deal of it, in the condition of a cuprous salt, which is much easier to be decomposed. I have always found that heat produces a considerable useful effect, probably because it facilitates the reduction. 4. While it is not exactly necessary, it is anyhow useful, to have the final bath contain an excess of alkali, but only in the form of ammonia or ammonium carbonate. An excess of carbonate of sodium, as I have often seen it recommended, is hurtful and can also hinder the deposit. 5. The salt of copper, which should be used by preference, is the acetate. My formula for the copper bath is:

Solution A.

Neutral acetate of copper.....	8 ounces
Crystallized sulphite of sodium.....	8 "
Carbonate of ammonium.....	1 1-3 "
Water	1 gallon

Solution B.

Cyanide of potassium (98-99 per cent.)...	9 1-3 ounces
Water	1 gallon

Solution A should be prepared warm and the solution B added to it, while heating it up a little more yet.

Brassing.—Brassing is not a very easy process. The majority of observations which I have presented for copper plating can also be applied to brass plating. The following is the formula which I have adopted after many experiments:

Acetate of copper.....	2 1/4 ounces
Dry chloride of zinc.....	1 1/8 "
Crystallized sulphite of sodium.....	11 1/4 "
Carbonate of ammonium.....	1 1/2 "
Cyanide of potassium.....	5 "
Water	1 gallon

Gilding.—The best bath is obtained by precipitating a solution of pure brown chloride of gold with ammonia and dissolving the fulminating gold in a solution of cyanide of potassium of 1 per cent. strength. When the solution has taken place, the liquid is heated to boiling. The quantity of gold must be at least 15 grains per quart. If a red gilding is desired, an addition is made of a quantity of acetate of copper, half the amount by weight of the total amount of gold present in the solution.

Platinizing.—The salt which merits the preference for platinizing is the chloroplatinite of potassium, $\text{Pt Cl}_2, 2\text{KCl}$. The salt which is obtained in commerce can be used and it is simply dissolved in water. At least 32 grains of the platinum salt must be present in the quart of water. One can also use a solution of platinum chloride, after it has previously heated for a long time with neutral potassium oxalate, in order to reduce a considerable amount of the platinic chloride to the lower platinous chloride.

Deposition of Iron.—One can simply employ the following bath:

Crystallized pure ferrous sulphate.....	5 1-3 ounces
Ammonium chloride.....	13 1-3 "
Water	1 gallon

*Translated from *Moniteur Scientifique*.

But in using this bath a deposit of basic salts of iron takes place, especially at the anode, which deposit interferes much with the good working of the bath. I have found that this is readily remedied by the addition of $3\frac{1}{2}$ ounces of citrate of ammonium, which prevents the deposition of oxide of iron and of basic iron salts.

OXIDIZED SILVER AND FRENCH GRAY.

By C. H. PROCTOR.

The following method for producing oxidized silver finish will be found far superior to the usual method of using very hot solutions of sulphide of potash. The solution retains its power of oxidizing three or four times as long and gives better results as to color. The articles are silver plated in the usual manner, washed and placed in a warm cyanide of copper bath composed of acetate of copper 1 lb., carbonate of soda 1 lb., bisulphite of soda 1 lb., cyanide of potassium 1 lb., and water, five gallons, or any of the usual formulas used for cyanide of copper baths. The articles remain in the bath for a few seconds, long enough to get a bluish of copper over the entire surface. They are then washed and immersed in a bath consisting of 3 oz. sulphide of potash and $\frac{1}{2}$ oz. 26% ammonia water to each gallon of water, used cold or slightly warm. This gives a smoky black effect, but when scratch-brushed wet, using a fine brass wire scratch brush and softening the water with sal soda, a beautiful gun metal finish is produced. When relieved in the usual manner by a soft rag wheel kept moist with water and using powdered pumice stone, or by the hand method using a rag, the finish will be found far superior to the usual oxidized finish.

French gray may be produced in the same manner or by using a very fine steel wire scratch-brush in the place of brass and using pumice stone, applied wet with a rag to the wheel. By brushing lightly, the gun metal tone will change to a very pleasing gray. The articles are relieved on the high grounds with the rag and pumice stone and are afterwards gone over with a plater's hand brush and pumice stone. This operation gives the grayish white effect that corresponds to the darker gray in the backgrounds. Sometimes parts of the high grounds are hand burnished to give better contrast, but that rests with the judgment of the operator. The goods are afterwards lacquered with a colorless lacquer.

RULES TO BE OBSERVED IN HANDLING NITRIC ACID.*

Due care should be used not to jar the necks of the carboys in opening them. A small, cheap saw will readily saw through the plaster of paris around the stopper, allowing it to come out easily. Heat of any kind will cause the acid in the carboy to swell and overflowing, it will generate heat when it comes in contact with the straw packing of the carboy and so break the glass bottle. Especially is this true when the carboy is allowed to stand in the sun.

When a carboy of acid is broken in a room, open the windows immediately to secure good ventilation, and at once throw an abundance of water over the acid on the floor and on the carboy. When the acid is all out of the carboy drag the latter out into the open air.

Never throw sawdust on nitric acid, as this greatly increases the volume of the deadly gases and does no good.

*By the Western Chemical Company.

Never allow a chemical engine to be used, and never throw soda on the acid, as these generate carbonic acid, which is a deadly gas, and makes a blanket over the deadly gases, thus confining them, as a rule, to the rooms.

It cannot be emphasized too much that great care should be used against inhaling the gases generated by this acid coming in contact with organic matter, such as wood or straw. This danger is further increased because there is very little, if any, irritation caused by inhaling these fumes, and they are thereby easily drawn into the lungs. This lack of irritation is without doubt due to the formation of a gas commonly known as "laughing gas," which deadens the nerves of the bronchial tubes.

It is always advisable to inhale weak ammonia gas as soon as possible, even if there is only a suspicion that men have inhaled these gases.

The person affected should inhale ether, alcohol or weak ammonia gas as soon as possible after having breathed the fumes, even though no bad effects are felt at the time. A small glass of water is then administered every ten minutes, into which three to five drops of chloroform have been added from a dropping tube until the patient recovers. The largest quantity of chloroform to be administered per day is 1.5 grammes. Three drops are considered as weighing .045 gramme.

This prescription is to be strictly observed and the amounts by no means exceeded.

LIQUID CAUSTIC POTASH.

The usual way of shipping solid caustic potash consists in packing it into an iron drum, in which it is kept from coming in contact with the air. This is necessary inasmuch as caustic potash in its solid form is very hygroscopic, that is, it absorbs moisture very rapidly. When brought in contact with the air, it becomes very mushy, especially if it is allowed to remain exposed. In order to remove the pieces of potash from the drum, it is necessary to open the latter and break up the solid mass inside into a large number of pieces. This is not by any means a very agreeable operation, as the material is very caustic and the handling of it is sometimes quite objectionable to the workman.

Liquid caustic potash, on the other hand, which is furnished of such a strength that two pounds of the liquid are equivalent to over one pound of the highest grade of solid potash, is of course, not subject to the above-mentioned disadvantage. It is not necessary at all to touch any of it with the fingers, as it can readily be drawn from the carboy, in which it is sold, by means of a syphon. The liquid potash solution is so saturated with solid potash that the slightest evaporation of the liquid will result in its solidifying upon the liquid being cooled. The handling of the material is thus considerably facilitated and the necessity of a laborious breaking up of the solid material into lumps is done away with.

The liquid can of course be added to the cleaning vats in any quantity, as may be desired. In this way a small bottle of say 2 or 3 gallons can be drawn out from the carboy any time and the liquid poured into the bath from the small bottle as desired. The liquid caustic potash is furnished in carboys, which weigh about 160 pounds. The advantages of using caustic potash in the plating industry are becoming generally known.

THE MANUFACTURE OF STEAM BRASS GOODS.

By W. L. ABATE.

It is seldom that one stops to consider the widely different fields into which brass enters as the mainstay of that particular field in which it is found. As boys we all knew that brass had an intrinsic value which was easily redeemable at the first junk shop we came to. We did not know anything about pot metal, yellow brass, steam metal, and the different bronzes at that time. When we look back now after having spent years in the various lines of the brass business, it seems to us that brass is common property, and that nothing can be said that is not already known, to those interested at least, and the field of steam, water and gas seems to be the longest and widest of the whole common property.

When we study the subject carefully we decide that steam is the paramount one of the three. The recent increasing of pressure of from 60 or 70 lbs. of steam on a boiler to one of from 150 to 250 lbs. and in many cases much higher than this for regular practice, is a change that is readily felt in the steam brass goods line. They must stand the pressure. They must stand the wear. They must have the finish, design, weight, and also bear the O. K. stamp of success on them. In their manufacture the composition must be right, the melting must be correctly done and the metal must be poured at the proper degree of heat to absolutely insure the maximum strength of the casting and the ultimate wearing qualities of the finished article.

To produce this most efficient result, the foundry foreman is almost entirely responsible, and let me say here that men of ability to fill these positions were never so scarce as at the present time. There is no department in the brass business so important and in which so much anxiety is felt for the result as the foundry. Is the foundry not a general source of constant contrary results to the superintendent or manager, who reasonably expects when he sends a new pattern to the foundry to be molded that he will have a casting at once? It was easy to design the pattern and to make it, and the casting will be easily finished in the machines, but to get the casting!

One is told that it was either rammed too hard or too soft, that it strained, or that the core was green or was not properly vented (this is generally one that holds good), or that the metal was not hot enough and so it did not run, or that it was too hot and the casting is porous, or, again, that the core was a good one, the mold was rammed just right, the metal was right and everything was favorable, *but*, it ran out. That's all! We try it again, and very often again, and we finally get a good casting, and there is general rejoicing in the foundry and the molder who made it is a hero and swells up until his hat needs a rubber band, because he has done a wonderful thing. He has done at last what he would have accomplished in the first instance, if he had used the ordinary precaution which is required to produce the article.

Along this line it may be said that the molding machine is an important factor in the founding of general brass goods. It always insures a full flask, properly gated and a clean mold when made. The castings are of a more uniform weight and less liable to strain than hand-molded ones. There are few patterns that cannot be handled successfully in a molding machine.

Perhaps in no one line of steam goods is the process and inspection so rigid as in that line which is made for the Government battleships. The choice of all the metals is carefully gone into and the casting is made with a test bar in the flask so that the tensile strength may be tested. This may be said also of many of the municipal contracts

for corporation cocks. Each have their own particular mixture which seems best for their purpose.

The melting of the metal plays a very important part in the actual results, and great care must be taken that it is not overheated. In this respect the old-time crucible furnace still does the best work, producing the most lively metal. While the cost of fuel is somewhat cheaper in the so-called "improved" furnaces, the loss is considerably greater when the metal is weighed up. Again, there is the disadvantage of having to pour the metal from the furnace to the carrying pot, thus exposing it to the air, which cannot help but be detrimental to its pouring qualities. Besides, it is necessary to heat it to a considerable degree, greater than is required to pour the casting. However, this can and undoubtedly will be improved in the near future as the attention of foundry men in general is being directed to this particular branch of the industry. The ideal furnace will be one that will protect the metal from the air blast while it is being melted. This must be done to prevent the metal from oxydizing. A small jet of compressed air introduced with the fan air in an oil burning furnace will increase its capacity wonderfully.

MELTING SCRAP ALUMINUM.

As the consumption of aluminum increases from year to year the question of the disposition of the scrap is demanding considerable attention. This question is not by any means as easy to be solved as might appear, for the metal when it is melted in contact with the air covers itself with a layer of oxide which is not reduced by charcoal. Ordinary aluminum scrap is also quite light and will rise above any flux that is used. The only way in which scrap aluminum can be satisfactorily melted is to plunge it at once underneath a mass of already melted metal. In this way it receives the heat necessary to melt it without being exposed to the air while being heated. It is not very well practical to dispose of much aluminum scrap when the melting is done in crucibles. There is, however, no difficulty at all about it when the operation is performed in a open hearth furnace, as is done everywhere where large quantities of aluminum are handled.

As far as the problem of disposing of scrap on a large scale is concerned, it is really no problem at all and the best course would be for people who operate on a small scale to have their scrap remelted somewhere where the proper facilities are obtainable for doing it. This could be done either by selling the scrap as such, or by having it remelted at a certain stated price per pound. The aluminum oxide is heavier than aluminum at ordinary temperatures, but it is lighter than the metal at the temperature of the melting furnace. If it is given proper opportunity it will therefore rise to the top of the melted metal. The lightest aluminum scrap is melted in an open hearth furnace with a loss in the neighborhood of one per cent. and the resulting metal is clean and free from oxide.

There is a revival of roller skating in some of the Western cities, and a noticeable change has taken place in the construction of the skate of former days. Instead of wooden rollers and tops they are now made with steel tops and aluminum rollers.

COMBINATION METAL MOLD FOR BRASS CASTINGS.

It is well known how much trouble is occasioned in the metal foundry by reason of the gases remaining in the mold and thus causing pin holes and other undesirable characteristics in the castings. A recent invention patented by F. Haggenjos, covered by patent 783,576, of February 28, 1905, aims to so construct the mold that as perfect a casting in metal combination molds can be made as by the old process of casting in sand molds. It is stated to be especially adapted for producing castings rapidly where a large amount of them are required of a single pattern, such as brass boxes or bearings for railroad cars, driving brasses, rod brasses, round and hexagon stick brasses, bushings, etc. The object has also been to avoid blow-holes in the castings and sand molds and scales on the surface of the castings and to provide for the shrinkage on the concave side of the casting by inserting a hard sand filling which lets off the gas. The filling also yields to the shrinkage of the casting as it cools and does not chill the bearing surface and produce hard streaks and scaly and porous places in the metal.

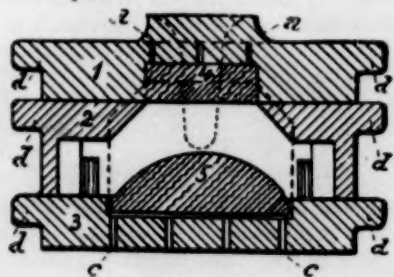


FIG. 1.

The mold is illustrated in Fig. 1 in vertical cross section. It will be seen that it consists of 3 parts, 1, 2 and 3, and the upper and lower hard sand fillings, 4 and 5. Means are provided by which the different parts of the mold may be put together properly and vent holes *a* and *c* are provided in the top and bottom of the mold to allow of the escape of gases. The hard sand fillings are made of sand of any suitable composition made in a hard sand filling box or pressed into the desired form. A gate for pouring is also provided.



FIG. 2.

In Fig. 2 is illustrated in horizontal cross-section a construction for the same purpose, but where the casting is poured in a vertical position. When it is necessary for the molten metal to enter the mold at its lowest point by means of a horn gate or sprue the vents are so located that the gas can escape from the cavity of the mold as the molten metal rises in it and fills it to its top. A sinker above the mold proper is used so as to make up for the shrinkage of the metal in cooling. The iron part of the mold consists of two parts, namely, *A* and *B*. A hard sand filling, *C* and vent opening *E*, are provided in the part *A*. The part *B* is provided with a horn gate, *D*, and a hard sand filling *C* and vent holes *E*. The hard sand filling *C* forms the top of the casting cavity and is de-

signed in the same way as the lower hard sand filling to provide a means of escape for the gases from the mold cavity. Suitable screws and clamps for closing the mold are provided.

It is stated that the operations of inserting the hard sand fillings, closing the mold, pouring, taking out the castings and brushing the mold and inserting the fillings again can be done very rapidly by cheap labor. After a few castings, however, the mold will get too hot and will have to cool a few moments. The durability of the mold is stated to be very great if it is not allowed to get too hot and to cool too quickly.

Another form of mold is shown in patent No. 783,577 by the same inventor. It is called a combination reversible skeleton mold, the combination being metal and hard sand fillings. It is constructed so that it may be used either side up, so that the mold can be filled by the molten metal through its back or it may be reversed and filled by the molten metal through its bearing side. As the mold is primarily intended for making brass castings, particularly such as are used in the various styles and kinds of journal bearings for light and heavy railroad cars, this feature is a necessity as some railroads specify bearings poured from the back and others want them poured from the journal or bearing side. The mold is illustrated in

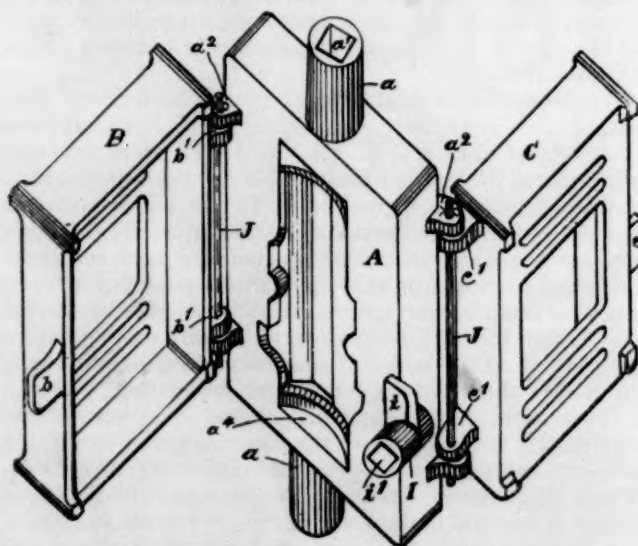


FIG. 3.

Fig. 3, and comprises three sections, *A*, *B* and *C*. The center-section is the mold proper and the two cages *B* and *C* are hinged to it. The locking buttons *I* hold the cages against the hard sand fillings in their seats or prints in the center section *A*. The latter forms the whole exterior band of the casting cavity and the beveled sides of its back, leaving only the flat portion of the back and the bearing side of the casting cavity to be covered by two hard sand fillings *D* and *E*. A perspective view of a

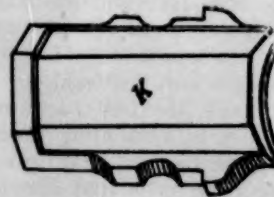


FIG. 4.

casting which represents the casting produced by the mold, is shown in Fig. 4.

MECHANICAL ELECTRO-PLATING.

There is a large class of work which can be successfully handled in a mechanical electro-plating apparatus, such as bolts, rivets, shells, buckles, metal buttons, lamp fixtures, sewing machine and typewriter parts, saddlery hardware, stove fittings, small novelties, trunk and bag fittings and a large variety of small work. Under ordinary conditions those articles have to be strung up or plated in trays and the introduction of the mechanical electro-plating apparatus ought to lead to a considerable cheapening in the cost of plating.

An apparatus recently put on the market for this purpose by The Hanson & Van Winkle Company, Newark, N. J., has been described in its essential details in THE METAL INDUSTRY, Vol. II., page 201. The following data about the apparatus, which is illustrated



MECHANICAL PLATING.

in the accompanying cut, will be of interest to our readers. For light work the plating baskets, either hexagon or round, are made of wickerwork, while hard rubber or other materials are used if the character of the work necessitates a change from the wicker barrel.

The standard 14 x 24 inch apparatus has a capacity of 50 to 75 pounds, according to the weight of the individual pieces of work. The apparatus can, however, be furnished with baskets or barrels up to a capacity of 500 pounds, and in the larger sizes suitable provision has been made for automatically lowering or raising the barrel from the solution.

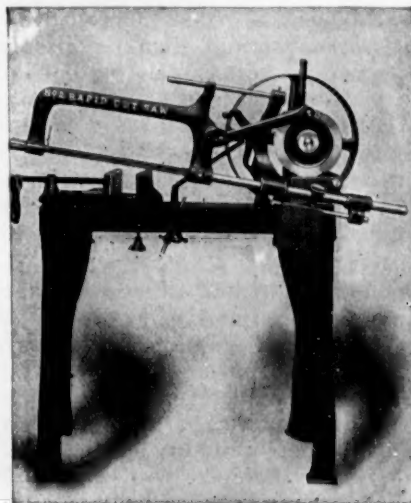
An elliptic curved anode, which is at all times equidistant from the work being plated, is used in the apparatus and it is claimed that on that account the time of deposit is shortened and the distribution of the metal on the work is more even. By the use of the present outfit together with the curved elliptic anode satisfactory work is stated to be turned out within ten minutes to one hour, according to the character of the work or the finish desired.

Six pounds of platinum were recently shipped to New York from the ore testing works of Henry E. Wood & Co., Denver, Col. This shipment is reported to equal the entire American production in 1903.

RAPID CUT POWER SAW.

A power saw is found to be one of the necessities of the modern metal working shop, and the accompanying cut shows a rapid cut power saw which is suitable for cutting tool steel, shafting, bar iron, brass in various forms, pipe, tubing, etc. It is, therefore, applicable in the tool working departments of the non-ferrous metal factories and also for sawing off the heavy sprues of some castings made from a particularly tough metal.

The saw has a swivel base, which is detachable from the bed and by this arrangement peculiar and



POWER SAW.

special cuts can be made, while it permits also the cutting of angles and bevels. The vise can be moved forward to use the full length of the blade in cutting small stock. When the saw is once started it requires no further attention, and therefore is a labor saver. It is made by the Robertson Manufacturing Company, of Buffalo, N. Y., who are builders of various kinds of rapid cut power saws.

KALYE.

Kalye for preparing metal surfaces for plating is recommended by a number of platers of experience. A plater who has tried it for years says the use of kalye avoids the necessity of using hydrochloric solution or the re-polishing of the surface as it leaves the lustre of the metal intact. It is especially recommended in plating novelty goods in nickel plate, where a high lustre is desired without re-polishing after plating. It is manufactured by the H. M. Anthony Company, 48 West Broadway, New York.

A subscriber writes that he had been out of the plating business for nearly a year and, not expecting to take it up again, had decided to give up his subscription to THE METAL INDUSTRY, but on reading the recent articles published on "Plating," his interest came back and he enclosed a dollar for another year.

Laboratory platinum ware seems to have become a favorite object of burglars. On March 14th the Columbus Iron and Steel Company, Columbus, Ohio, was a victim to the extent of 12 platinum crucibles and three platinum dishes. The company offers \$50 reward for information leading to the arrest and conviction of the thieves.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York

Q.—A plater asks for a formula for tin plating.

A.—The rolling mill process of tinning brass and copper is the most successful. A satisfactory formula for plating may be made up by using water $2\frac{1}{2}$ gallons, carbonate of potash 36 ounces, tin salt 2 ounces, and 98 per cent. cyanide of potash 4 ounces. The solution should be made up as follows: The carbonate of potash should be dissolved in the warm water and the tin salt should then be added. The above quantity of potassium cyanide should then be dissolved in the solution. In use the solution should be slightly warm and anode plates of cast tin should be used. A tension of 4 volts should be used for deposition. The distance between the anode and the cathode, when plating sheets, should not exceed more than six inches. The best results will be obtained with this bath, where motion can be imparted to the solution.

Q.—A brass founder inquires what effect the addition of aluminum to brass castings has, whether it will smoothen the castings or do the opposite.

A.—The addition of aluminum to brass castings is made for the twofold purpose of facilitating the casting of the metal and increasing its strength. When used for the first purpose, a very small quantity of aluminum is all that is required to be used; good results having been obtained with an amount as low as 0.05 per cent., or about $\frac{1}{4}$ ounce of the metal to 100 lbs. of the mixture. This small addition, however, brings about a greater fluidity in the running of the metal and enables it to fill out corners in the mold sharply and give the metal a bright surface, while the amount is not sufficient to cause an appreciably greater shrinkage. The addition of aluminum enables the metal to run a large distance without chilling. Attention should be paid that not too much aluminum is added, by weighing the amount necessary carefully, as a greater quantity will make the metal hard and increase the shrinkage.

Q.—A brass founder has difficulty of getting the red color on his red metal casting, and would like to have information as to what is necessary to produce this color.

A.—The trouble seems to be due to the oxidation of the surface of the metal on account of removing the castings too quickly from the sand after they have been poured. This oxidation results in the castings assuming a variegated shade of colors and prevents the metal from showing its true color. Better results will probably be obtained by leaving the castings in the sand at least 15 or 20 minutes after pouring, by which time they should have cooled down sufficiently to prevent the oxidation. If the castings are blown out in water while still very hot, in order to remove the core sand, it would of course be impossible to leave them in the sand for the time mentioned. In that case the remedy might be effected by adding $\frac{1}{4}$ to $\frac{1}{2}$ ounce of sulphuric acid to the water used for blowing out the core sand, approximately that amount to the gallon of water. The articles should then be passed through a vessel containing clean water, which serves as a wash. A soap solution, as mentioned in THE METAL INDUSTRY, Vol. II., p. 187, might also be used to advantage, and if used at the boiling point, will dry the castings out and prevent further ox-

dation. It will also help to give color to the castings. These manipulations can be accomplished very quickly, when the necessary vessels are once rigged up.

Q.—A brass founder inquires about mixture to be used in making valves.

A.—A mixture for red metal used by a large concern, is made up as follows:

Copper	89 lbs.
Zinc	5 lbs.
Tin	4 lbs.
Lead	2 lbs.

To obtain a color slightly darker than brass, the following mixture is used:

Copper	81 lbs.
Zinc	14 lbs.
Tin	2 lbs.
Lead	3 lbs.

Q.—A plater wants to know the formula for an acid copper bath for plating on zinc. He has a great deal of trouble with his cyanide of copper bath, which plates very good on the outside but takes a long time to plate on the inside of the wares.

A.—The acid copper baths cannot be used for plating on metals more electropositive than copper, such as zinc, iron, tin, etc., inasmuch as the metals attack the acid copper solutions and precipitate copper from them, while an equivalent amount of the more electropositive metals is dissolved. If the articles plate too slowly on the inside in your solution, it is an indication that the conductivity of your solution is too low and it should therefore be increased by the addition of about an ounce of sodium carbonate and about the same amount of sodium bisulphite. A copper bath which is recommended as giving good results consists of 10 oz. carbonate of soda, 8 oz. crystallized sodium bisulphite, 10 oz. potassium cyanide, and 8 oz. of neutral acetate of copper to three gallons of water, the soda being dissolved first and the bisulphite added to it gradually, after which the acetate of copper is also gradually added with stirring. The cyanide of potash is dissolved in a separate vessel, and both solutions are mixed with stirring, when a clear solution should be obtained which is allowed to settle and syphoned off. If the bath should not become colorless, a little more cyanide should be added. The copper content of the solution may be increased if a heavier deposit is desired.

Q.—A brass founder wants a mixture for bronze castings for art and ornamental work.

A.—The following mixture gives satisfaction:

Copper	90 lbs.
Tin	6 lbs.
Zinc	3 lbs.
Lead	1 lb.

Q.—A plater wants to know how to make chloride of platinum for oxidizing silver.

A.—See answer to similar inquiry in the March, 1905, issue of THE METAL INDUSTRY, page 53.

Q.—A plater wants a bright dip for brass-plated goods.

A.—A bright dip is composed of 100 parts sulphuric acid, 75 parts nitric acid and one part of salt. As is

the case with all dipping work, it depends upon the experience of the plater for its success, especially in regard to the time necessary for the work to be left in the dip in order to obtain the desired effect. The articles should then be very quickly rinsed in cold water, followed by hot water, after which they should be dried in sawdust.

Q.—A subscriber informs us that he has some nickel anodes which he has used for three or four years, and which have been seemingly entirely converted into black oxide. Although they are about $\frac{3}{8}$ inch thick, they are so soft that they will hardly sustain their own weight, and if taken up sideways, will break into pieces, which can be crushed between the thumb and the finger to a fine black powder.

A.—The cause of this peculiar behavior is not exactly understood, the supposition being that it is due to impurities present in the nickel metal of the anode. A similar phenomenon has been attributed to local action, the particles of certain foreign elements present in the metal of the anode forming a galvanic battery with the nickel and the sulphuric acid and thus dissolving the nickel. A similar case was described and illustrated in THE METAL INDUSTRY, Vol. I, page 102, and the powder, into which the anode disintegrated in that case, proved to be of about the same composition as that of the original anode, and was neither oxide of nickel or iron. In that case the phenomenon was tentatively attributed to the presence of aluminum in the anode, which was supposed to have been added to the nickel of the anode to facilitate casting. Altogether the exact cause of the problem is still unexplained.

Q.—A brass founder wants a formula for making heavy castings, such as bushings and engine bearings, of phosphor bronze.

A.—An alloy of high tensile strength and toughness is obtained by using 85 per cent. copper and 15 per cent. phosphor tin, for making heavy main shaft journals. The use of zinc should be avoided. For coupling and crank rod journals 90 per cent. copper and 10 per cent. phosphor tin has been recommended. This latter alloy should also contain no zinc.

Q.—A plater wishes to know whether there is such a thing as an acid brass solution.

A.—The brass solutions used generally contain an excess of potassium cyanide, and are therefore alkaline. There is no brass solution known to us, which contains an excess of acid. You may perhaps, have reference to the small amount of arsenious acid, which is frequently put into the brass solutions, especially by the older school of platers, and the use of which is stated to produce good results. The small quantity of arsenious acid added to the bath is, however, not sufficient to make the bath acid, as the potassium cyanide much preponderates.

The elastic limit of phosphorbronze wire is very close to its ultimate strength, so that it can be loaded up nearly to the breaking point without a sensible deformation of the wire taking place.

A good skimmer may be made by welding a piece of gas pipe onto an iron rod and flattening the latter. A light skimmer which may be readily controlled is then produced. Skimmers should be made of the best iron, and under no consideration should steel be used.

READERS' OPINIONS.

Correspondence is solicited from all of our readers on subjects relating to the founding, finishing, rolling and plating of the non-ferrous metals and alloys. Name and address must be given, though not necessarily for publication. Address THE METAL INDUSTRY, 61 Beekman street, New York.

BRASS FOUNDRY PRACTICE.

By A FOUNDRY FOREMAN.

In polishing light plain castings, the workman sometimes finds just beneath the surface small holes. This means trouble for the foundry. If the casting is made of bronze or composition, the cause may be traced to wet sand, too hard ramming, too hot or too cold metal, all or any of which will produce the spongy condition. If the metal is a copper zinc alloy, the problem is often more difficult to solve, as economy requires that the articles be cast in green sand if possible, and that the loss be limited to not over five per cent.

One feature to contend with and from which there is no escape, is the fact that in order to turn out a smooth casting, fine sand must be used. This inevitably confines the gases in the mold for a longer period than would a coarser sand and is the cause of much of the trouble. In establishments where power may be readily obtained, the value of the sand mixer and the conveyor cannot be overestimated in the thorough mixing and even tempering, the facility in taking away and returning the sand to the molder in much better condition than can be possibly accomplished when cut over by hand.

In making the mold the old saw that practice makes perfect is peculiarly applicable, while on the other hand eternal vigilance is necessary to retain perfection in evenly and not too hard ramming of the sand. The same may be said of the melting, for while the machinist or patternmaker may by following certain mechanical rules produce a desired result, the melter's product is, in spite of rules and careful attention to business, an unknown quantity. The varied quality of the fuel, the constantly varying impurities in the metals, and even the weather conditions, unite in producing chemical changes and evolving gases that are sure to have an effect on the melt.

One of the greatest blessings ever bestowed on the melter in this connection was the introduction of phosphorus into the foundry. Nearly all alloys of copper are improved, for casting in sand, by its use and especially so are bronze and yellow brass. By adding one third of one per cent. of phosphorus to the alloy the effect is immediate. One of the best methods used to introduce it into the mixture is in the shape of phosphor tin, the tin increasing the fluidity of the metal, while the phosphorus reduces the oxides and a sound smooth casting the molder may be proud of is the result.

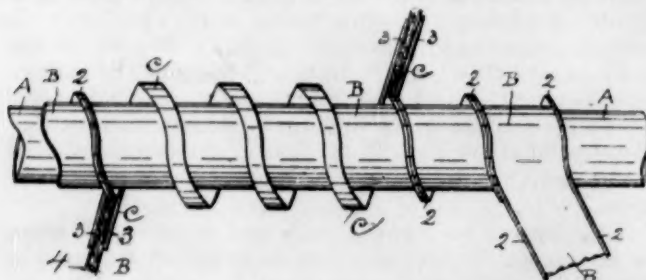
The bi-monthly meeting of the Brass Manufacturers' of the United States was held at the Russell House, Detroit, Mich., March 7th and 8th, with John J. Ryan, of Chicago, the President, presiding, and William M. Webster, of Chicago, as Secretary. The Association decided to re-affirm the prices of January 18th. Three new firms were admitted to membership, making a total of 36.

PATENTS

A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

781,808. February 7, 1905. PROCESS OF REDUCING VANADIUM. F. R. Carpenter, Denver Col.—The process consists essentially in producing an alloy of vanadium with iron or copper, the operation being carried out in a blast furnace with a charge consisting of the ore containing vanadium and an oxide of the metal to be alloyed with it, besides the required amount of flux to slag off the impurities in the ore.

780,974. January 31, 1905. FLEXIBLE METALLIC TUBE. F. J. Carroll, Hamilton, Canada.—The tube comprises an inner tin tube A around which is wound a spiral copper cover B, which latter has outwardly extending side flanges. An outer spiral copper

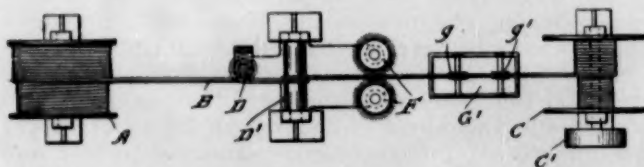


strand C, with inwardly extending flanges and a fabric packing between them, winds spirally around the outer part of the first flanges, so that the sides of the latter fit closely against the sides of the flanges of the spiral copper cover B, thus preventing leakage of the flexible tube.

782,068. February 7, 1905. SOLDERING IRON.—L. Silcoff, Mount Vernon, O.—The iron has an adjustable soldering point controlled by a hand-wheel at the lower part of the handle which actuates a suitable mechanism.

781,560. January 31, 1905. FLEXIBLE TUBING. S. Scoguamillo, New York.—The tube consists of an inner spiral of metal which is covered by a specially constructed outer metallic tube of boxlike shape with a concave outer seat, the latter situated in the spaces left between the spirals and adapted to receive a packing slip.

781,078. January 31, 1905. PROCESS OF REMOVING SCALE FROM WIRES, RODS, ETC. A. B. Legnard, Waukegan, Ill.—The process of removing scale consists in coiling the wires, rods, etc., around a roll of small diameter as it passes continuously from one reel to the other, and then passing it around another roll at right



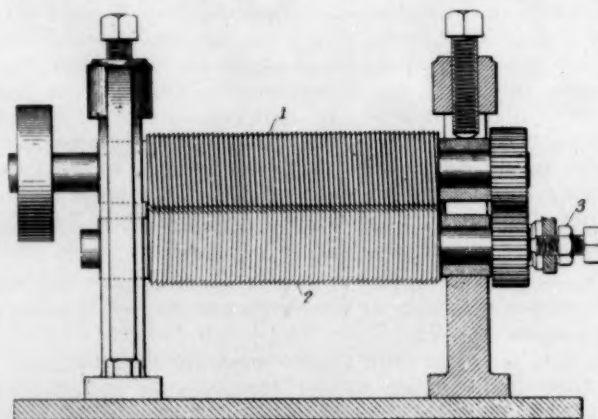
angles to the first, which insures the crinkling and loosening of the scale, as the wire is subjected to the sharp bendings. The scale is then removed by a pair of rotating brushes and the wire passed through a weak solution of sulphuric acid.

782,056. February 7, 1905. METHOD OF BRAZING METALS. J. F. Richardson, Pittsburg.—The method of brazing, as applied to rail sections, consists in holding the rails together by two metallic plates, putting sheets of brass between these plates and the rails, placing powdered brass and a flux, such as borax, upon the plates and the heads of the rails, and fusing the whole together by means of a blowpipe.

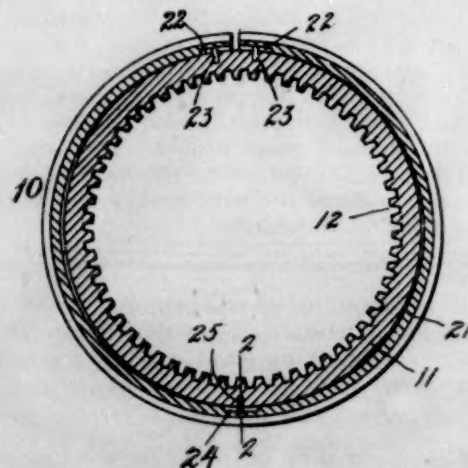
783,170. February 21, 1905. METAL PLAQUE. H. L. Beach, Coshocton, Ohio.—This ornamental plaque is constructed of two separate sheet metal disks which are arranged and fastened together so as to represent a fine china plaque. The two disks can be ornamented in any desired way and covered with a white coating in imitation of china.

783,332. February 21, 1905. PROCESS OF SOLDERING ALUMINUM. M. Tomellini, Genoa, Italy.—The process consists in cleaning the parts which form the joint, fitting them nicely together and heating them at the joint on a bed of charcoal to almost the fusion temperature of aluminum. A copper rod is then applied to the joint and it is heated to a temperature higher than the fusion point of aluminum, whereby the aluminum enters into combination with the metal of the soldering rod at the points of contact. The aluminum can take up very little of the metal of the rod by reason of the higher fusing point of the latter and therefore it absorbs of the foreign metal only such a small quantity that the alloy formed is in no way dissolved and that after the union of the soldered pieces the seam cannot be detected.

782,977. February 21, 1905. MACHINE FOR SLITTING SHEETS OF METAL OR OTHER FABRICS. A. F. Madden, Newark, N. J.—The machine has two cylinders superposed upon each other. Upon one is formed a right-hand thread and on the other a left-hand thread. When the rollers are revolved and a sheet of material introduced between them, it will be cut in slits, the number of which will depend upon the number of threads on the cutter and the distance between the slits upon the pitch of the threads.



783,361. February 21, 1905. LEAD PIPE FOR STEAM OF HIGH PRESSURE. F. Briefs, Dusseldorf, Germany.—The pipe is constructed of an interior steel or copper ribbon rendered tight by asbestos string, around which a tube of lead several millimeters thick is cast. The lead in a fluid condition fills out the spiral-shaped exterior grooves of the core barrel.



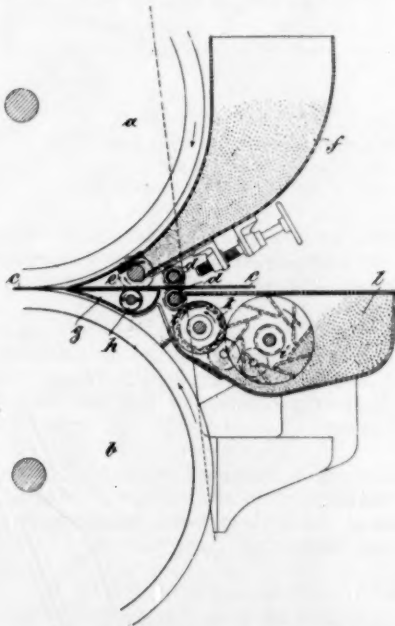
784,264. March 7, 1905. WIRE DRAWING DRUM. J. A. Horton, Providence, R. I.—The drum has an annular body, 11, and is provided with internal gear-teeth, 12, for driving it. It is pro-

vided with a split ring, 21, for the purpose of giving the drum a slight lateral yield to compensate for inequalities in the strain on the wire. Several such drums are mounted in tiers and are located in a receptacle filled with a lubricating fluid.

783,218, March 2, 1905. SAND BLAST APPARATUS. J. D. Murray, San Francisco, Cal.—The apparatus comprises a receiver containing air under pressure and a chamber containing sand, flexible pipes connecting these vessels to an ejecting nozzle, means to regulate the quantity of air and sand and means to supply water to the air conducting pipe in order to do away with the formation of dust during sand blasting.

783,951, February 28, 1905. MACHINE FOR SLITTING SHEET METAL. C. J. W. Hayes, Detroit, Mich.—The slitting machine comprises a pair of rotating arbors arranged on opposite sides of the work and a series of disks mounted on one arbor, the beveled portions of which terminate in a cutting edge. A series of similar disks are mounted upon the other arbor.

784,460, March 7, 1905. MACHINE FOR GRINDING OR POLISHING METAL ARTICLES. C. Wiesener, Solingen, Germany.—The apparatus comprises two grinding rollers *a* and *b*, between which is



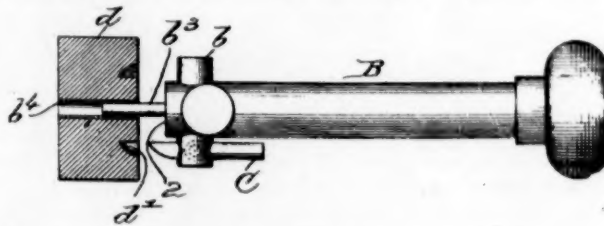
held the sheet metal plate *c* by means of guiding rollers *d*. The grinding material falls on the plate from hopper *f* by means of a distributing roller *e*. The lower grinding roller is provided with grinding material by means of a scoop roller *k* and feeding

roller *i* in the receptacle *l*. The material falling between the articles *c* under treatment does not fall onto the lower grinding roller, but is caught by a receptacle *g* and conveyed from the latter to the side by a worm or conveyor *h*.

784,101, March 7, 1905. APPARATUS FOR BENDING PIPE. L. H. Brinkman, West Hartford, Conn.—The invention refers to an automatic bending apparatus, especially for pipe of the larger sizes, without requiring it to be filled. A constant bending strain is applied to the pipe while it is being heated at the same time successively by an annular burner. The mechanism also comprises means for moving the burner automatically along the pipe as the latter is bent.

784,517, March 7, 1905. PROCESS OF EXPANDING SLITTED SHEET METAL. L. E. Curtis, Chicago, Ill.—The sheet of metal to be expanded is first slit in longitudinal staggered rows and is then subjected to a bending operation commencing at one end of the sheet and a point between the side edges and proceeding to the other end. The bending is in diagonal lines, crossing the slits.

781,041, March 7, 1905. MOLD CUTTER. W. H. Ford, Lowell, Mass.—The mold cutter is intended to cut mold spaces or cavities in charcoal or similar soft material for casting articles, as



finger-rings, etc. The mold cutter comprises a suitably supported shaft, which carries a cutting tool, which has its end shaped so as to cut an annular groove into the mold material, corresponding in form with the outline of the casting to be produced.

784,515, March 7, 1905. METAL CUTTING MACHINE. A. C. Calkins, Los Angeles, Cal.—The machine comprises a hollow mandrel, constructed to receive sheet material, and means for circulating a refrigerating fluid through the mandrel to keep it cool. It also comprises mechanism for revolving the mandrel and cutting devices. It is particularly intended for cutting zinc shaving, which are employed for precipitating gold, silver and other metals from solutions containing cyanide of potassium.

783,271, February 21, 1905. MACHINE FOR CLOSING THE BOTTOMS OF COLLAPSIBLE TUBES. H. W. Herbst, London, England.—The machine comprises mechanical devices for closing, turning up, folding over and upsetting or swelling out the bottoms of collapsible tubes by means of juxtaposed pairs of bars forming jaws adapted to act upon the tubes simultaneously. Devices are also provided for imparting the requisite movements to the bars and holding the tubes in the right position.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

A brass foundry has been opened at 622 Cherry street, Philadelphia, Pa., by George W. Lindsay.

W. F. Price, an inventor of a gasoline lamp, has begun the manufacture of gas fixtures at Reading, Pa.

The A. T. Stearns Lumber Company, of Boston, Mass., make a specialty of cypress tanks for the use of platers.

All of the brass and copper rolling mills of Rome, N. Y., are extremely busy and a number of them have been running nights.

"Some Interesting Facts" is the title of a pamphlet on drop presses issued by the Peck Drop Press Works, New Haven, Conn.

Nickel anodes, all sizes made from the highest grade of Canadian nickel of guaranteed percentage are manufactured by the Dow Chemical Manufacturing Company, Mansfield, Ohio.

The Liberty Brass Foundry, of Buffalo, N. Y., had an exhibit of their auto castings at the Automobile Show recently held in Buffalo, N. Y.

The Archer Iron Works of Chicago, Ill., have issued a catalogue illustrating their steel wheelbarrows, one model of which is suitable for foundries.

M. A. Rourke has bought the Maloney Bronze Works, of Pittsburgh, Pa. Mr. Rourke has been in the metal business for a number of years.

John Hughes, who died recently at Belleville, N. J., had been employed in wire drawing at the Dewitt Wire Cloth Company's factory for forty years.

Gold, silver and brass solders, all grades; also plumbers' solder and anti-friction metal by Thomas Clare, 155 Bay street Taunton, Mass.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

Joseph Rosenthal's Sons, metal dealers of Philadelphia, Pa., report that they were never so busy as at present and are selling 100 tons of metal a day.

Scrap aluminum in the form of sheet, clippings, castings, turnings and borings is bought by the Electric Smelting & Aluminum Company, of Lockport, N. Y.

In a few months Michael Hayman & Co., of Buffalo, N. Y., expect to be located in their new smelting plant which is situated on the Belt Line of railroad.

The Newark Metal Company, Newark, N. J., have bought all of the scrap metals left from the fire of the factory of J. E. Mergott Company, of Irvington.

A. Schultz & Co., metal dealers and solder makers of Baltimore, Md., report that their works are running till 9 o'clock every night to keep up with orders.

The Aurora Foundry Company, of Aurora, Ill., are putting on an extension to their foundry of 70 x 50 feet. They are also erecting a pattern building and office.

Divine Brothers Company, of Utica, N. Y., manufacturers of high-grade cotton buffing wheels, report that they are overloaded with business in all departments.

Richard Lowenthal, a dealer in old metals, of Chicago, Ill., is having a five-story factory building erected at the southwest corner of Twentieth and Sangamon streets.

Charles Mundt & Sons, New York City, makers of perforated sheet brass, tin, copper, zinc, etc., have installed recently considerable machinery to increase their production.

The Harrington-Wiard Company, with a capital of \$25,000, have been incorporated at Buffalo, N. Y., and will begin to manufacture gasoline engines about May 1st.

C. G. Hussey & Co., of Pittsburgh, Pa., rollers of sheet copper, report that their new train of rolls is in operation and will increase their capacity 400,000 pounds per month.

The Pittsfield Spark Coil Company, Pittsfield, Mass., are located in their new factory and are now making the same size shipments as they were before their loss by fire.

The Delaware Metal Refinery, of Philadelphia, Pa., which suffered a loss by fire some months ago, have rebuilt their refinery and are running the same as before the fire.

The Salo Art Metal Company, of New York city, have been incorporated to manufacture art metal goods including name plates, etched metal goods, clock dials, and novelties.

The Luce Electro Plating Works have opened a plating plant at Binghamton, N. Y. The company report that they have one of the most modern plants in the State of New York.

The Easton Brass and Machine Works, Easton, Pa., which has been established fifty years, has moved into new and larger quarters, where they will have a thoroughly modern plant.

The G. C. Dom Supply Company have been organized at East Pearl street, Cincinnati, Ohio, and will cater especially to buyers of brass and copper goods, tin foil, zinc and metals.

The Heath Machine Company, of Binghamton, N. Y., have begun the manufacture of a new gas engine suitable for factory and motor boat purposes. The company are also building motor boats.

The Ohio Brass & Iron Manufacturing Company, of Cleveland, Ohio, have increased their capital stock from \$50,000 to \$100,000 and intend to push more energetically their make of plumbers' supplies.

The Rome Manufacturing Company, Rome, N. Y., have occupied the whole of their new two-story brick addition 40 x 120, using it as a packing room. This increases their output materially.

The James A. Spargo Wire Company, Rome, N. Y., have been running night and day for eight months past and still have plenty of orders. Their plant has been increased in size during the past year.

The Field-Brundage Company, Jackson, Mich., are building a new cement and steel factory 300 x 60 feet. The company report that their gas engine has many good points which make it suitable for factories.

Some 5,000 feet of floor space has been added by the enlargement of the E. Stebbins Manufacturing Company's works at Springfield, Mass. The space will be devoted to the making of plumbers' supplies.

The Ohio Brass and Iron Manufacturing Company, Cleveland, Ohio, does not intend to erect any new buildings at present with their recently increased capital, but will use the money in extending their business.

The Atlas Smelting & Refining Company, of Philadelphia, Pa., have bought the rights, title and good will of the Colonial Refining Company of the same city and will carry on the business the same as heretofore.

The Roberts Chemical Company, of Niagara Falls, N. Y., have decided to sell their potash in the granular form, making it easier to remove from the drums. They also manufacture liquid potash specially for the use of platers.

The Carborundum Company, of Niagara Falls, N. Y., will shortly have ready for the market Carborundum fire sand in the form of bricks, furnace size and suitable for high temperature work required by oil and gas furnaces.

The New Jersey Zinc Company, of Pennsylvania, report that the improvements made at their South Bethlehem works consists particularly of centralizing their power plant. No material extension of their works has been made.

The Genesee Metal Works, of Rochester, N. Y., have recently put in a kettle for melting white metals which will produce 30,000 pounds, or a carload at one time, also giving a uniform grade of metal. The Genesee Works are very busy.

Fries & Co., of Buffalo, N. Y., have secured the contract for all the bronze work for the McKinley monument which is to be erected in Buffalo, and which work consists of chains and bands requiring about 1,000 pounds of bronze.

The Uehling-Decker Company, of Passaic, N. J., are marketing the "Rayflex" flashlight, which is used as a search lantern. It is made of a tube of aluminum which contains a battery that will give from 6,000 to 8,000 flashes before requiring a renewal.

A modern smelting works located in the city of Milwaukee, Wis., is that of the Cream City Smelting Works. They utilize

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

electric power, have three crushers and a Dings magnetic separators, and wash and smelt the residues of the leading plants of the city.

The April number of *Graphite*, a publication of the Joseph Dixon Crucible Company, Jersey City, N. J., contained some interesting information for users of graphite. The paper frequently has articles on graphite crucibles which are of interest to foundrymen.

R. B. Seidel, Inc., proprietors of the Philadelphia Black Lead Crucible Works, Philadelphia, Pa., have bought property adjoining their plant and will enlarge their works. This will considerably increase their capacity. The building operations will begin at once.

The Board of Trade of Wilkesbarre, Pa., are making efforts to secure the location of a brass foundry and automobile factory in their city. Secretary Sharpe reports that the interested parties have not as yet decided whether to rent buildings or buy land and put up new ones.

The Eagle Brass Works, of Detroit, Mich., have just issued catalogue B, which describes their brass goods for steam and water. They desire to call special attention to their ground key work which they test at 250 pounds hydraulic pressure and which work is unqualifiedly guaranteed.

The Perth Amboy Foundry & Machine Company, Perth Amboy, N. J., have been incorporated with a capital of \$100,000 to do a foundry and machine business. The officers are: Peter A. Johnson, president and treasurer; Mary L. Johnson, secretary; Hugh Dickson, vice president.

The Theodore Hofeller Company, of Buffalo, N. Y., are making a specialty of automobile castings in aluminum, brass and bronze. They report a very good trade. The company are also one of the largest firms of metal dealers in the country and make a specialty of ingot aluminum.

The George A. Ray Manufacturing Company, of Buffalo, N. Y., report that they have been running nights for a number of months to keep up with their orders. They are one of the largest consumers of sheet copper in the United States, and are putting a new line of coffee urns on the market.

At the recent meeting of the American Brass Company the following officers were elected: C. F. Brooker, president; E. L. Frisbie, Jr., first vice president; A. A. Cowles, second vice president; J. S. Elton, third vice president; J. P. Elton, secretary and treasurer; James A. Doughty, assistant secretary.

The McKenna Bros. Brass Company, of Pittsburgh, Pa., have very good reports on the aluminum bowling balls, two dozen of which have been in use for a number of months. The balls are popular in the different alleys and seem to stand the racket very well. They are made standard weight, 16 1-2 pounds.

The New York Aluminum Company has been re-organized under the name of the Aluminum & White Metal Manufacturing Company with offices at 336 Broadway, New York, and factory at Newark, N. J. Their specialty is the spinning, stamping and casting of aluminum and all kinds of white metals.

The Ajax Metal Company, of Philadelphia, Pa., have in one day run 151 heats of metal, 600 pounds to a heat, making the total for a day's run 91,000 pounds. All of the Ajax plants located at Philadelphia and Birmingham, Ala., and their branches at Montreal, Canada, and Paris, France, are extremely busy.

We are informed by the Bates & Peard Annealing Furnace Company, of Huyton, Liverpool, England, that their steam annealing furnace is now being operated by Société Anonyme de Cuivre et Zinc, Belgium, and the Mouchel Company, of Paris, France, and is also being operated at the Royal Mint, London, England.

M. T. Moore, who has conducted a plating business at Syracuse, N. Y., has taken into partnership William Schuler, who has been in his employ for six years, and the firm is now known as the Syracuse Plating Works. Their plant has recently been enlarged and in addition to their regular jobbing work they will manufacture flatware.

The Damascus Bronze Company, of Pittsburgh, Pa., have already utilized all the space afforded by the addition to their foundry. Their plant is equipped in all of the latest appliances, including the overhead trolley. They are producing 35,000 pounds of metal per day, and have orders enough in hand to last them until September.

Moses Atwood, vice-president and general manager of the Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, Pa., recently died at his home in Allegheny. Mr. Atwood was fifty-six years of age and had been engaged in the brass foundry business for many years. He was at one time head of the firm of Atwood & McCaffrey.

H. M. Shimer & Co., of Philadelphia, Pa., have started to make high-grade spelter which they state an analysis shows to be 99.9 pure zinc. The spelter is manufactured particularly for manufacturers of high-grade brass. H. M. Shimer & Co. are also busy making brazing solders, in February having sold 67,000 pounds of this material.

The J. W. Paxson Company, Philadelphia, Pa., manufacturers and dealers of foundry supplies, issue each month an attractive desk calendar. If any brass founder has been overlooked in the distribution of the calendars the company will gladly send them one. With this year the J. W. Paxson Company will have been in business for half a century.

Louis Schulte, who has been a foreman plater with Tiffany & Co. for a number of years, has patented some special apparatus for plating and has started in business for himself at 61 Beekman street, New York. Mr. Schulte sells prepared nickel salt for all purposes, zinc salt for cold galvanizing and automatic self-feed apparatus for plating sheet metal.

The Pittsburgh Brass Manufacturing Company, Pittsburgh, Pa., have recently cast two ornamental bronze tablets 36 x 48 inches for the Fort Pitt National Bank. The company is making a specialty of this work and at present employ steadily two modelers making patterns and casts. The company have recently put in a number of molding machines.

The Traver Packing Joint Hose Company have been incorporated at Far Rockaway, N. Y., with a capital of \$200,000, for the purpose of manufacturing patent couplings invented by Philip Traver. The Traver's coupling is more particularly for fire hose, and it is said will save some time in coupling and breaking a hose, which is an important necessity with firemen.

At the annual meeting of the Norwalk Brass Company, Norwalk, Conn., the following officers were chosen: President, Wallace Dunn; secretary, Reed G. Haviland; treasurer, Oscar H. Banks; general manager, Frank Comstock. The company is in a flourishing condition and the manager reports that they make the best brass casting on earth. Their specialty is marine hardware.

The first annual meeting of the stockholders of the American Zinc and Chemical Company was recently held in Denver, Col. The following officers were elected: President, Walter Lyon, Pittsburgh, Pa.; vice-president, C. E. Dewey, Denver, Col.; treasurer, J. T. Keil, Pittsburgh; secretary, Fred J. Shaler, Pittsburgh; The company are developing a process for utilizing the base zinc ores of Colorado.

The M. E. Moore Bronze and Plate Company, of Kingston, N. Y., have elected the following officers: M. E. Moore, president and treasurer; Hewitt Boyce, vice-president, and E. J. Binch, secretary. The business was founded thirty years ago in Brooklyn and continued in New York city. In 1898 the company bought a large plot of ground and moved the factory to Kingston, N. Y., to meet the growing demands of business.

The Peerless Smelting & Refining Company has been formed at Philadelphia, Pa., for the purpose of manufacturing all kinds of white metals and will be ready for business in April. The plant will be located at Richmond street and Alleghany avenue. C. N. Bergen, who has been superintendent of Merchant & Co.'s plant for many years, is president of the Peerless Company, and associated with him are members of the firm of L. Goldstein's Sons.

The Sweet & Doyle Valve Company have been incorporated with a capital of \$75,000 by H. M. Sweet, E. C. Doyle, J. E. MacLean, of Cohoes, N. Y., and Thomas H. Champion, Troy, N. Y., and James L. Scott, Saratoga Springs, N. Y. The company are equipping a new plant at Troy and will manufacture a full line of the Sweet and Doyle gate valves, both in brass and iron. Also a full line of globe, angle, check valves, etc. The plant began operations April 1st.

The foundry supply house of Cutter, Wood & Stevens Company, of Boston, Mass., have, through their agent, Wm. T. Nicholson, recently equipped a new brass foundry to be called the Hope Metal Company, located at Kingsly avenue and Eagle street, Providence, R. I. The manager of the company, Mr. McGrail, was with the Gorham Manufacturing Company a number of years. Another new New England brass foundry is that of William J. Roche, who has opened a shop at New Britain, Conn., and at present is doing a good business.

A NEW ROLLING MILL.

The National Brass and Copper Company has been formed by several Pittsburgh men and has bought a plant at Lisbon, Ohio, to manufacture brass and sheet copper. At present the company will manufacture sheet copper only. The officers are: P. Goldsmith, president; B. Goldsmith, vice-president, and J. L. Goldsmith, secretary and treasurer. The company expect to start their rolling mill in April.

TOBIN BRONZE CATALOGUE.

An interesting catalogue on Tobin Bronze has just been issued by the Ansonia Brass and Copper Company, of New York City and Ansonia, Conn., the sole manufacturers of this alloy. The catalogue states the forms in which Tobin bronze is sold, what it is suitable for, a description of its tensile strength, specific gravity, acid tests, crushing strength, etc., and instructions for ordering and using Tobin bronze. The catalogue also contains a number of valuable tables of the weights of the metal in different forms, and testimonials from the leading manufacturers who have used it.

A LARGE WHITE METAL WORKS.

The Hoyt Metal Company have moved into their new Eastern plant at Maurer, N. J., which consists of a mixed metal building 50 x 250 feet, equipped with melting pots ranging from 800 to 100,000 pounds capacity, and making it possible to manufacture 250 tons of mixed metal daily. The large kettles are supplied with patent stirring and pouring apparatus, so that a 50-ton mixture can be made with uniformity and run into the molds inside of two hours. Besides the mixed metal building the company report that they have a separate building for refining metals and

drosses 50 x 100 feet and equipped with a newly-invented apparatus which gives the largest possible returns for the least possible operating expense. The Eastern plant is a branch only of the company's Granite City works, which is three times the size and capacity in every department of the Eastern plant. The Hoyt Company claim that they are the largest manufacturers of mixed metals in the world. Their main office is at St. Louis, Mo., and they have a branch office at 71 Broadway, New York, in charge of E. T. Merrick.

METAL MARKET NEWS

COPPER.—The market for copper during the past month has held remarkably steady considering the lack of the late foreign orders and the general apathy of home consumers. Prices are nominally unchanged. Casting has ranged from 14 $\frac{3}{4}$ to 15 cents and for some brands 15 $\frac{3}{4}$ cents has been paid.

China came in as a buyer when the European demand began to slacken, and now that China is no longer an active factor in the market the very natural impression among home consumers is that prices are likely to give way. For spot delivery and quick shipments full prices have to be paid, but for shipments running over the next three months prices can be shaded from $\frac{1}{8}$ to $\frac{1}{4}$ cent. The exports for February totaled 15,866 tons and for the month of March the exports are 20,168.

In the foreign market G. M. B.'s have declined nearly £1 per ton, while the price of best selected has remained fairly steady at around £72.

TIN.—The tin market has suffered from the usual violent fluctuations through speculators in London and prices have been gradually forced to a higher level. Spot tin in London has lately been quoted at £139 10s., against £131 on the first of the month. In New York prices advanced from 28 $\frac{3}{4}$ to 30 $\frac{3}{4}$ cents.

LEAD.—The lead market has held firm, with a good demand. The leading interest advanced the price during the month \$1 per ton.

SPELTER.—With the freer movement of ores the high prices lately ruling had to give way and the price of the metal declined from 6 $\frac{1}{4}$ to 5 $\frac{3}{4}$ cents at the end of March. Based on the price of ores to-day 5 $\frac{3}{4}$ cents does not pay the smelter, and there is talk about a general restriction to put prices up to a paying basis. Consumers have been buying rather more freely at the decline, but most of them look for even lower prices.

OLD METALS.—In scrap copper the demand has been good and dealers have been able to get full prices for all first class stock.

TRADE WANTS

POSITION WANTED by experienced chemist in brass and bronze, white and bearing metals, alloys, assay of tin, lead and zinc drosses and all that class of non-ferrous material. Address, Chemist, 3811 Pier Street, Pittsburgh, Pa.

WANTED.—Alloys that will withstand the action of sulphuric acid of 55° Be. and 8° to 30° Be. at 70° F. Peter T. Austen, 89 Pine Street, New York.

A PLATER with a shop which has been established six years in a good western city would like to associate himself with a good reliable experienced gold and silver plater and burnisher. \$2,000 required. Your experience is more essential than money. Address PLATER, THE METAL INDUSTRY.

A PRACTICAL BRASS MOULDER, having from twelve to fifteen hundred dollars can purchase one of the best jobbing brass foundries in one of the leading cities of Ohio. Business established several years. Splendid contracts paying good prices. Reason for selling, owners have other interest that demands their attention. Address B. B. F., care METAL INDUSTRY.

PATENT FOR SALE of an oil brazing furnace. Will braze all metals, including cast iron. The furnace can be manufactured at comparatively low cost and brazes at less cost than a gasoline or gas brazing furnace. For further particulars address THE METAL INDUSTRY.

Metal Prices, April 5, 1905

METALS

TIN—Duty Free.	Price per lb.
Straits of Malacca.....	30.25
COPPER, PIG, BAR AND INGOT AND OLD COPPER—	
Duty Free. Manufactured $2\frac{1}{2}$ c. per lb.	
Lake	15.37½
Electrolytic	15.25
Casting	15.00
SPELTER—Duty $1\frac{1}{2}$c. per lb.	
Western	6.00
LEAD—Duty Pigs, Bars and Old $2\frac{1}{8}$c. per lb.; pipe and sheets $2\frac{1}{2}$c. per lb.	
Pig Lead.....	4.55
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots.....	35.00
1,000 lb. lots.....	34.00
Ton lots	33.00
ANTIMONY—Duty $\frac{3}{4}$c. per lb.	
Cooksons	8.12½
Hallets	7.87½
Other	7.62½
NICKEL—Duty 6c. per lb.	
Large lots	45 to 50
Small lots	50 to 75
BISMUTH—Duty Free.....	\$1.50 to \$2.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
SILVER—Duty Free—Commercial Bars.....	\$0.56
PLATINUM—Duty Free	19.00
GOLD—Duty Free	20.00
QUICKSILVER—Duty 7c. per lb. Price per Flask.	40.00

Zinc—Duty, Sheet, 2c. per lb. 600-lb. casks, 8.00 per lb., open, 8.50 per lb.
 Tobin Bronze—Rods, Unfinished, 19c.
 Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
$2\frac{1}{2}$ per cent.....	19c.
5 per cent.....	19½c.
$7\frac{1}{2}$ per cent.....	20½c.
10 per cent.....	21½c.

Manganese Bronze, Ingots.....16 to 17c.
 Phosphor Bronze, Ingots.....16 to 20c.
 Silicon-Copper, Ingots.....32 to 36c.

OLD METALS

Heavy Cut Copper.....	13.25c.	14.50c.
Copper Wire	13.00c.	14.25c.
Light Copper	11.75c.	13.00c.
Heavy Mach. Comp.....	11.25c.	12.50c.
Heavy Brass	8.50c.	9.50c.
Light Brass	7.00c.	8.00c.
No. 1 Yellow Brass Turnings....	7.75c.	8.75c.
No. 1 Comp. Turnings.....	10.00c.	11.00c.
Heavy Lead	4.00c.	4.35c.
Zinc Scrap	4.25c.	4.75c.
Scrap Aluminum, sheet, pure...	22.00c.	25.00c.
Scrap Aluminum, cast, alloyed..	12.00c.	18.00c.
Old Nickel	15.00c.	25.00c.
No. 1 Pewter.....	20.00c.	21.00c.

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x90 and heavier	64oz. to 96oz. sheet 50 to 75 lb. 30x90	32oz. to 64oz. sheet 25 to 50 lb. 30x80	24oz. to 32oz. sheet 18¾ to 25 lb. 30x80	16oz. to 24oz. sheet 12¾ to 18¾ lb. 30x80	14oz. and over 11 to 12¾ lb. sheet 30x80
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	19	19	19	19	19	20
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	19	19	20
	Longer than 96 ins.	19	19	19	19	19	21
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	19	19	19	19	19	21
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	19	19	21
	Longer than 96 ins. Not longer than 120 ins.	19	19	19	19	20	22
	Longer than 120 ins.	19	19	19	20	21	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	19	19	19	20	21	23
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	20	22	24
	Longer than 96 ins. Not longer than 120 ins.	19	19	19	21	23	27
	Longer than 120 ins.	19	19	20	22	25	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	19	19	19	20	22	25
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	21	23	28
	Longer than 96 ins. Not longer than 120 ins.	19	19	20	22	25	
	Longer than 120 ins.	20	20	21	23	27	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	19	19	20	22	27	
	Longer than 96 ins. Not longer than 120 ins.	19	19	21	24	29	
	Longer than 120 ins.	20	20	22	27		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	20	20	22	25		
	Longer than 96 ins. Not longer than 120 ins.	21	21	23	26		
	Longer than 120 ins.	22	22	24	28		
Wider than 108 ins.	Not longer than 120 ins.	23	23	25			
	Longer than 120 ins.	24	24	27			

Rolled Round Copper, $\frac{3}{4}$ inch diameter or over, 19 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, $2\frac{1}{2}$ c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, April 5, 1905

Net Cash Prices. COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb.	23c.
Lighter than 10 oz.	29c.
10 oz. and up to 12 oz.	26c.
12 oz. and up to 14 oz. to square foot, per lb.	24c.
Circles less than 8 in. diam., 2c. per lb. additional.	
Circles over 13 in. diam. are not classed as Copper Bottoms.	
Polished Copper Bottoms and Flats, 1c. per lb. extra.	

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order.
Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
	2	12	14	16	18	20	22	24	26	28
Wider than and including	12	14	16	18	20	22	24	26	28	30
To No. 20 inclusive.	.23	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.23	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add ½ cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, in.	\$0.23	\$0.27	\$0.32
Above No. 10 to No. 16	.23½	.27½	.32½
No. 17 and 18	.24	.28	.33
" 19 and 20	.25	.29	.34
" 21	.26	.30	.35
" 22	.27	.31	.36
" 23	.28	.32	.37
" 24	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 30 per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 3¼ in. O. D. Nos. 4 to 13 Stubbs Gauge, 20c. per lb.
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size	1/4	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/4	4	4 1/4	5	6
Price per lb.	28	27	25	21	20	20	20	20	20	21	22	24	26	27

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

Plain	Round	Tube	3/4 in.	up to 2 in.	to No. 19	inc.	Per lb
"	"	"	"	"	"	"	\$0.35
"	"	"	"	"	"	"	.36
"	"	"	"	"	"	"	.38
"	"	"	"	"	"	"	.41
"	"	"	"	"	"	"	.43
"	"	"	"	"	"	"	.45
"	"	"	"	"	"	"	.48
"	"	"	"	"	"	"	.50
"	"	"	"	"	"	"	1.00
"	"	"	"	"	"	"	1.50
Smaller than 1/4 in.							Special
3 inch to 3 1/2 inch, to No. 19, inclusive							.38
3 inch							.40
Over 3 inch to 3 1/4 inch							.43
Over 3 1/4 inch							.50

Bronze and copper advance 3 cents. Discount 35 per cent.

PRICE LIST FOR SHEET ALUMINUM

Outside Diameter in inches.	No. 12.	No. 14.	No. 16.	No. 18.	No. 20.	No. 22.	No. 24.	Outside Diameter in inches.
1-4				10	9	8	7	1-4
5-16				11	9	8	7	5-16
3-8				12	9	8	7	3-8
1-2				14	11	9	8	1-2
5-8			21	16	13	12		5-8
3-4			25	19	16	14		3-4
7-8			28	22	18	16		7-8
1			30	25	21	19		1
1 1/4			36	30	25			1 1/4
1 1/2			52	43	35	28		1 1/2
1 3/4			60	50	41	33		1 3/4
2	84	68	58	47	37			2

Discounts as follows are given for sheet orders over 200 pounds.

200 to 1,000 pounds	10 per cent.	10 per cent. off list.
1,000 to 2,000	10 per cent. and 2	
2,000 to 4,000	10	" "
4,000 pounds and over	10	" "

Sheets polished or satin-finished on both sides, double the price for one side.

Price Per Foot of Seamless Aluminum Tubing.

(CHARGES MADE FOR BOXING.)

Outside Diameter in inches.	No. 12.	No. 14.	No. 16.	No. 18.	No. 20.	No. 22.	No. 24.	Outside Diameter in inches.
1-4				10	9	8	7	1-4
5-16				11	9	8	7	5-16
3-8				12	9	8	7	3-8
1-2				14	11	9	8	1-2
5-8			21	16	13	12		5-8
3-4			25	19	16	14		3-4
7-8			28	22	18	16		7-8
1			30	25	21	19		1
1 1/4			36	30	25			1 1/4
1 1/2			52	43	35	28		1 1/2
1 3/4			60	50	41	33		1 3/4
2	84	68	58	47	37			2

Discount 20 to 30 per cent.

ALUMINUM

Drawn Rod and Wire Price List.—B. & S. Gauge.

Diameter R. & S. G'o.	0000 to No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17	No. 18	No. 19	No. 20	No. 21	No. 22
Price per lb.	\$.38	.38½	.39	.39½	.40	.40½	.41	.41½	.42	.43	.44	.47	.50

200 lbs. to 30,000 lbs., three cents off list.

30,000 lbs. and over, four cents off list.

PLATE AND SHEET PRICE LIST.—B. & S. GAUGE.

Prices are for 50 pounds or more at a time. Less quantities, 5 cents per pound additional. Charges made for boxing.

Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in. All columns except the first are for Flat Rolled Sheets.